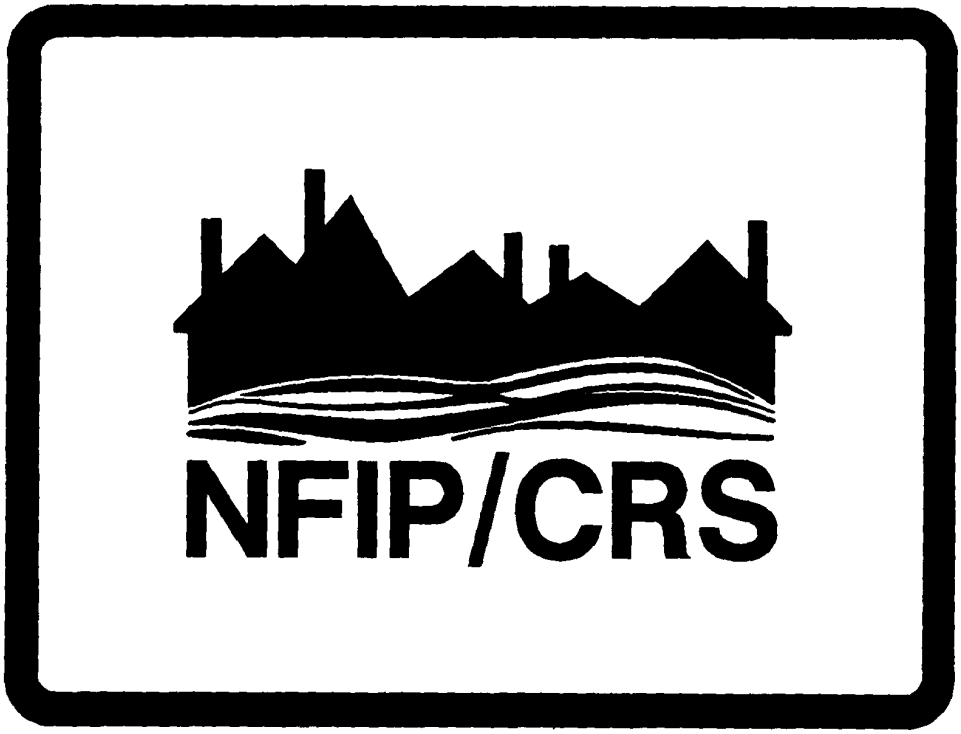
FEDERAL EMERGENCY MANAGEMENT AGENCY

National Flood Insurance Program
Community Rating System



CRS CREDIT FOR HIGHER REGULATORY STANDARDS

January 1999

Note on this January 1999 Edition: This document was revised to reflect the following changes in the 1999 *CRS Coordinator's Manual*:

- The credit points for freeboard (FRB), protection for critical facilities (PCF), enclosure limits (ENL), and low density zoning (LZ) were substantially increased.

- New ways to obtain credit are provided for foundation protection (FDN), cumulative and lower substantial improvements (CSI and LSI), natural and beneficial functions regulations (NBR), and enclosure limits (ENL).

- Two new elements have been added: state-mandated regulatory standards (SMS) and building code and staffing (BCS).

It should be noted that communities will continue to receive credit for higher regulatory standards credited under older versions of the *CRS Coordinator's Manual.* At the community's next cycle verification visit, the ISO/CRS Specialist will use the new scoring criteria. If a community wants to take advantage of these higher points and new elements sooner, it may submit a modification as explained in Section 215 of the *CRS Coordinator's Manual*.

This document was prepared for the Community Rating Task Force by the Insurance Services Office, Inc., with support from French & Associates, Ltd., and the Association of State Floodplain Managers, Inc.

If a community is interested in applying for flood insurance premium credits through the Community Rating System (CRS), it should have the *CRS Application*. The *CRS Coordinator's Manual* provides a more detailed explanation of the credit criteria. These and other publications on the CRS are available at no cost from:

Flood Publications
NFIP/CRS
P.O. Box 501016
Indianapolis, IN 46250-1016
(317) 848-2898
Fax: (317) 848-3578

They can also be viewed and downloaded from FEMA's web site, ***www.fema.gov***

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CREDIT CRITERIA

The National Flood Insurance Program (NFIP) regulations require that new buildings and substantial improvements to existing buildings be protected from the base flood. However, buildings can still be damaged by a flood for several reasons.

For example, a flood could be greater than the predicted 100-year flood. The flood hazard can be increased by urbanization and other changes in the watershed and filling and other development in the fringe that reduces flood storage capacity. A community may be subject to special flood-related hazards, such as rising lake levels or ice jams, that are not fully addressed by the NFIP regulations.

There are, therefore, a variety of reasons why a community would want to enact regulatory floodplain standards that are higher than the minimum NFIP requirements. The NFIP's Community Rating System (CRS) provides insurance premium rate reductions to encourage communities to do this. More restrictive state or local regulatory standards take precedence and are encouraged by the NFIP regulations (Section 60.1(d)).

430 Higher Regulatory Standards

Activity 430 (Higher Regulatory Standards) is the primary CRS activity for crediting floodplain development regulations that are more restrictive than the NFIP requirements. The basic credit criteria are explained in the *CRS Coordinator's Manual*. This publication expands on those explanations and provides examples of credited regulatory language and guidance on how to calculate the credit points for Activity 430. The section numbering for this publication matches the system used in the *CRS Application* and the *Coordinator's Manual*.

a. Definitions

There are several terms and acronyms used throughout this publication that need to be clarified. The following are summaries of technical terms that are officially defined in the NFIP regulations.

NFIP Regulations. The rules and regulations of the National Flood Insurance Program (NFIP). To participate in the NFIP, a community must enact and enforce development regulations that meet the minimum requirements of the NFIP regulations. These are found in the *Code of Federal Regulations*, Title 44, Parts 59 and 60. Appropriate sections are quoted in this paper. A complete set of 44 *CFR* Parts 59 and 60 can be obtained from the Regional Offices of the Federal Emergency Management Agency (FEMA), which are listed in Appendix A of the *Coordinator's Manual*. A summary of the NFIP regulations and how they relate to CRS credits is in Appendix D of the *Coordinator's Manual.*

FIRM. Flood Insurance Rate Map. An official map of a community on which FEMA has delineated the community's Special Flood Hazard Areas (SFHA).

SFHA. Special Flood Hazard Area. The SFHA is the 100-year floodplain that is shown as an A or V Zone on the Flood Insurance Rate Map (FIRM) for the community. The NFIP regulations require that the community regulate new development in the SFHA.

BFE or base flood elevation. The base flood elevation is the elevation of the base or 100-year flood as designated on the community's FIRM. The NFIP regulations require that new buildings and substantial improvements to existing buildings in the SFHA have their lowest floors (including basement) at or above the base flood elevation. Non-residential buildings must be elevated or floodproofed to or above the base flood elevation.

Floodproofed. As used in this document, a building is floodproofed if the walls and floor are watertight and capable of withstanding the hydrostatic and hydrodynamic forces that accompany the base flood. It is the same as "dry floodproofed" as used in the *Coordinator's Manual*. The NFIP regulations prohibit new or substantially improved residential buildings from being floodproofed. They must be elevated at or above the base flood elevation.

A Zone. The SFHA (except for coastal V Zones) shown on a community's FIRM. There are five basic types of A Zones:

- A—no base flood elevation provided
- A1–A30—e.g., A7 or A13, where base flood elevations are provided
- AE—the new way to show A1–A30
- AO—sheet flow, ponding, or shallow flooding
- AH—shallow flooding with elevations

There are two other types of A Zones that are shown on some FIRMs: AR and A99. These areas will be protected by a flood control system that was under construction or repair when the map was published. AR and A99 Zones are not considered SFHAs or regulatory floodplains for CRS purposes.

V Zone. The coastal SFHA subject to waves of 3 feet or more. The V Zone is subject to more restrictive regulatory requirements than A Zones. The NFIP regulations require that the lowest horizontal member of new or substantially improved buildings in V Zones be elevated on engineered piles or columns to or above the base flood elevation. There are three types of V Zones: V, V-numbered, and VE, which correspond to the A Zone designations.

Substantial damage. Damage of any origin sustained by a building whereby the cost of restoring the building to its before-damage condition would equal or exceed 50% of the market value of the building before the damage occurred. If a building is substantially damaged, the NFIP regulations require that it be treated as a new building and be elevated (non-residential buildings may be floodproofed) to or above the base flood elevation.

Substantial improvement. Any reconstruction, rehabilitation, addition, or other improvement to a building, the cost of which equals or exceeds 50% of the market value of the building before the start of construction of the improvement. If a building is substantially improved, the NFIP regulations require that it be treated as a new building and be elevated (non-residential buildings may be floodproofed) to or above the base flood elevation.

b. Regulations Recognized in Activity 430

Activity 430 (Higher Regulatory Standards) has 13 elements that include additional requirements that increase the level of protection provided to floodplain development. These are the most common regulatory requirements that exceed the minimum NFIP requirements for floodplain management. Each element has an acronym that is used in the credit calculation formulae. The acronyms are a shorthand method of referring to the elements. The 13 elements are detailed in subsections a through m in Section 431.

a. Requiring buildings to be protected to a level higher than the base flood elevation. The extra protection is called freeboard and the element appears as "FRB" in the calculation formulae.

b. Requiring that fill and building foundations be designed to protect them from damage due to erosion, scour, and settling. The acronym for foundation protection is "FDN."

c. Requiring that all improvements or repairs are counted cumulatively toward the substantial improvement requirement. This requirement, known as cumulative substantial improvement, or "CSI," ensures that owners do not evade flood protection measures by making many small improvements that eventually add up to a major or substantial improvement.

d. Using a threshold lower than 50% of the building's value to determine when the substantial improvement requirement takes effect. The acronym for a lower substantial improvement threshold is "LSI."

e. Requiring that critical facilities, such as hospitals and hazardous materials storage sites, be protected from higher flood levels. "PCF" stands for protecting critical facilities.

f. Maintaining floodplain storage by prohibiting fill or by requiring compensatory storage. Although floodway regulations preserve flood conveyance, they allow the flood fringe to be filled in. The resulting loss of storage can have a significant effect on downstream flood heights, especially in flat areas. The acronym for preserving flood storage capacity is "PSC."

g. Prohibiting or regulating developments that can have an adverse impact on public health or water quality, including alterations to shoreline, channels, and banks. Because such regulations protect the natural and beneficial functions of floodplains, the acronym is "NBR."

h. Prohibiting the lower areas of elevated buildings from being enclosed ("ENL").

i. Other regulations that exceed the minimum requirements of the NFIP regulations. The acronym for such other higher regulatory standards is "OHS."

j. Zoning to minimize the number of buildings in the floodplain. Low density zoning ("LZ") reduces the damage potential within the floodplain and helps maintain flood storage and conveyance capacity.

k. Requiring additional regulations in areas subject to special hazards. The NFIP regulations are oriented toward the more common overbank and coastal flooding. Special hazards regulations ("SH") are requirements tailored to the different conditions found in the following situations:

- Closed basin lakes
- Ice jams
- Land subsidence
- Coastal dunes and beaches
- Uncertain flow paths (e.g., alluvial fans and moveable bed streams)
- Mudflow hazards
- Coastal erosion
- Tsunamis

l. Implementing state-mandated regulatory standards ("SMS") whereby all communities are required to administer a state rule or adopt state development criteria.

m. Having a Building Code Effectiveness Grading Schedule classification of 6 or better and/or trained or certified regulatory staff ("BCS").

c. Regulations Recognized Elsewhere

The regulations credited in Activity 430 are related to protecting insurable buildings located in the floodplain. Communities may have other regulations related to flooding, stormwater management, or water resources protection. Many of these are credited under other CRS activities, such as the following:

- Requirements for developers or sellers to publicize or disclose the flood hazard on their properties are credited under Activity 340 (Flood Hazard Disclosure).

- Requiring permit applicants to develop base flood elevations or study the impact of their projects on flood heights or velocities in floodplains where such data are not provided by the NFIP is credited under Activity 410 (Additional Flood Data).

- More restrictive floodway mapping, "zero rise floodway," and "full urbanization hydrology" requirements are also covered under Activity 410.

- Prohibiting new buildings in the floodway, V Zone, or other part of the floodplain is credited under Activity 420 (Open Space Preservation). A community can only receive credit for a prohibitory regulation under either Activity 420 or Activity 430, not under both. Activity 420 provides more credit points than Activity 430 does because new buildings are better protected from flooding if they are kept out of the floodplain in the first place. Therefore, most communities opt to credit prohibitory regulations under Activity 420.

- Requiring new developments to provide retention or detention of their stormwater runoff to minimize the increase in flood flows due to watershed urbanization is the subject of Activity 450 (Stormwater Management).

- Erosion and sedimentation control regulations are also covered in Activity 450 because they reduce siltation and the resulting loss of channel carrying capacity.

- Requiring developers to implement appropriate "best management practices" that will improve the quality of stormwater runoff is credited in Activity 450.

- Regulations on dumping or placing debris in stream channels are credited under Activity 540 (Drainage System Maintenance).

- Regulating new development downstream of dams to protect it from flooding from a dam break is credited in Activity 630 (Dam Safety).

d. Legal Aspects

For the purposes of this activity, creditable regulations must be legally enforceable requirements placed on floodplain development. They do not have to be enforced by the community but they do have to be legally enforceable by a government agency. For example, state regulations or requirements from a county or regional drainage or flood control district may be credited if they have jurisdiction in the community.

In most states, regulations are in the form of state statutes, codes or regulations, or local ordinances or by-laws. Plans, such as land use plans and comprehensive plans, are usually recommendations, not regulations. A community that submits a plan for credit under this activity must also submit its attorney's opinion that the plan has the force of law and is enforced by a regulatory office, such as a building or zoning department.

Most floodplain regulations appear in a zoning ordinance, a building code, or a separate floodplain management ordinance. They cover construction projects throughout the community or throughout the community's floodplain. Some regulations appear in subdivision ordinances, health regulations, or other special purpose ordinances.

In some cases, an ordinance, especially a subdivision ordinance, will refer to state or local policies, specifications, a design manual, or other separate document. Many local officials have said, "developers don't argue, they follow this manual because we tell them to." Unless the separate policy document is specifically adopted by reference in the ordinance, the community will have to include a statement from its legal counsel that its policies and design standards have the force of law.

Similarly, some regulations state that something "may be required" or that a permit applicant "should" do something. The CRS only credits clear and explicit regulations that require specific actions or standards from a floodplain developer. Generally the word "shall" indicates such a requirement. For example, the following language WOULD NOT be credited.

> *If, in the opinion of the building official, the soils are not suitable for construction, appropriate fill and compaction may be required.*

The following language WOULD be credited.

> *The applicant shall provide a soils engineering report based on the results of one soil boring for each acre where the following soil types are present. . . .*

Generally, statements in the purpose or objective section of an ordinance are not acceptable. The CRS credits the specific requirement, not a statement about a reason for adopting the ordinance. For example, many communities have language that says one of the objectives of the ordinance is "To prevent fraud and victimization of unwary land and home buyers." Nowhere else in the ordinance is there a reference to fraud or a specific disclosure requirement. Therefore, credit under Activity 340 (Flood Hazard Disclosure) has not been provided for that language.

In some cases, state laws provide the authority for a state agency or a community to do something. Usually a state agency will implement regulations or a community will enact an ordinance pursuant to the law. It is the subsequent regulations or local ordinance that must be submitted for CRS credit, not the authorizing or enabling legislation.

Sometimes a requirement is meaningless without the definition section of the ordinance or regulation. Instead of requiring buildings to be elevated 1 foot above the base flood elevation, some communities require them to be elevated above a "flood protection elevation." In these cases, the community needs to also submit the ordinance section that defines the "flood protection elevation."

As with all regulatory issues, the opinion of the community's attorney or corporation counsel is most important. If language is not accepted by the ISO/CRS Specialist because it does not appear to be clear, explicit, or consistently enforceable, then the community may submit a letter on its attorney's letterhead stating that the debated item has the force of law. An example of this approach is discussed on page 22.

COMMUNITIES SHOULD BE CAREFUL WHEN USING MODEL ORDINANCES AND THE EXAMPLES IN THIS PUBLICATION. A community should not amend its ordinances solely to earn CRS credit points, nor should it necessarily adopt these examples verbatim. Ordinance language should be carefully written to support the community's goals and the purposes of its regulatory program, to sufficiently respond to the flood hazard facing the community, and to conform with state law. ALL SUCH LANGUAGE SHOULD BE REVIEWED BY THE COMMUNITY'S LEGAL COUNSEL BEFORE ADOPTION.

431 Credit Points

This section identifies the 13 elements and corresponding CRS credit point values under Activity 430. The NFIP regulations are explained to clarify the minimum requirements so the reader knows what is needed to exceed those requirements. The NFIP regulations are shown in boxes with single line borders. As in the *Coordinator's Manual*, the credit criteria of the *CRS Schedule* are shown in shaded boxes with double line borders. Examples of regulatory language are shown as block quotations *in this italicized typeface.* Scoring examples are shown **in this typeface**.

This section also covers how each element is scored, provides example regulatory language, and identifies some of the more common problems and misunderstandings found in community CRS applications. As used in this section, the terms "new buildings" or "new construction" also mean substantial improvements to existing buildings or construction and repairs to substantially damaged buildings.

a. Freeboard (FRB)

Freeboard is a term for an extra margin of protection. Ordinances or laws with a freeboard requirement add height above the base flood elevation to account for future flood fringe development, uncertainties inherent with the methodologies, lack of data, waves or debris that accompany the base flood, and floods higher than the base flood. In a floodplain management ordinance, a freeboard requirement means that new buildings will be protected to a level higher than the NFIP's base flood elevation.

NFIP Requirement. In A Zones where base flood elevations have been established, the NFIP rules require that the lowest floors of residential structures be elevated to or above the base flood elevation. Non-residential structures must be elevated or floodproofed to or above the base flood elevation.

NFIP Regulations:

44 *CFR* Sections 60.3(c)(2) and (3)

A community must

(2) Require that all new construction and substantial improvements of residential structures within Zones A1–A30, AE and AH zones on the community's FIRM have the lowest floor (including basement) elevated to or above the base flood level . . .

(3) Require that all new construction and substantial improvements of non-residential structures within Zones A1–A30, AE and AH zones on the community's FIRM (i) have the lowest floor (including basement) elevated to or above the base flood level or (ii) together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy.

44 *CFR*, Section 60.3(e)(4)

In coastal high hazard areas (V Zones), a community must

(4) Provide that all new construction and substantial improvements in Zones V1–30 and VE, and also Zone V if base flood elevation data is available on the community's FIRM, are elevated on pilings and columns so that (i) the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to or above the base flood level . . .

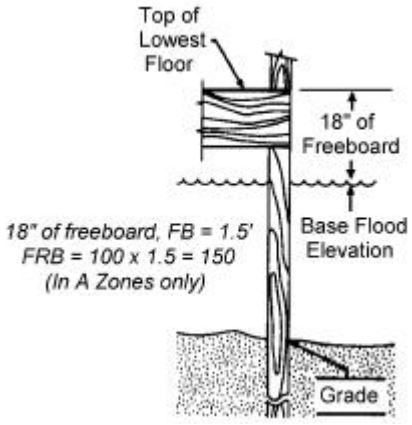
Scoring. The CRS credit calculation formulae have two acronyms. "FB" is the number of feet of freeboard. If the community requires new buildings to be 1 foot above the base flood elevation, FB = 1.0. Eighteen inches of freeboard means FB = 1.5.

The other acronym, "FRB," is the score for the freeboard credit. The value of freeboard increases as it gets greater, so FRB is calculated with a formula.

1. FRB = 100 x FB.
2. For FB of 3.0 feet or more, FRB = 300.

In the case of 1 foot of freeboard, FB = 1.0 so FRB = 100 x 1.0 = 100. If the freeboard requirement is 18 inches, FB = 1.5 and FRB = 100 x 1.5 = 150. The maximum score for FRB is 300.

NOTE: *In A Zones the lowest floor is measured from the top of the floor. In V Zones, the elevation requirement is measured from the bottom of the lowest horizontal structural member. If the illustration to the right was for a V-Zone building, the freeboard would be measured from the bottom of the floor joist.*



Other formulae reflect the value of freeboard in different situations, including elevating above increased flood stages resulting from future floodplain encroachments, elevating above the 500-year flood level, basing the elevation requirement on a point lower than the top of the lowest floor, requiring freeboard in AO Zones, and requiring freeboard only for some new construction.

3. If the ordinance uses the encroached elevation, add 0.5 to FB.

Detailed riverine flood studies that produce a floodway provide a flood elevation based upon the floodway encroachment. These elevations are listed in the "With Floodway" column in the Floodway Data Table in the community's flood insurance study. They are generally higher than the "Without Floodway" or "Regulatory" flood elevations. For example, if the community requires that the lowest floor be at least 1 foot above this encroached or "with floodway" elevation, FB = 1.0 + 0.5 = 1.5 and FRB = 100 x 1.5 = 150.

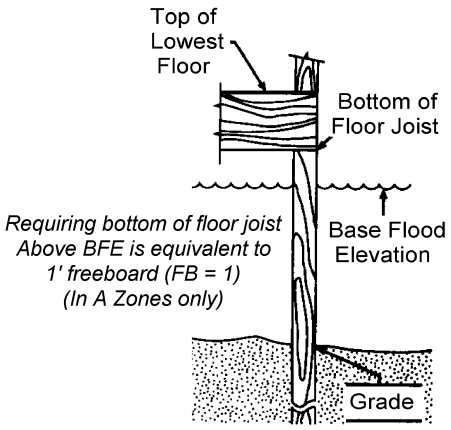
4. For FRB credit, the 500-year flood elevation is considered to be 1 foot higher than the base flood elevation, unless the community demonstrates that it is higher. If freeboard is based upon the 500-year flood, add 1.0 to FB.

Elevating to the 500-year flood provides more protection than elevating to the base flood elevation. Section 431.a.5 provides credit equivalent to 1 foot of freeboard. For example, if the community requires that buildings be elevated to the 500-year flood level, FB = 1.0 and FRB = 100 x 1.0 = 100.

Base flood and 500-year flood elevations can be found in the community's flood insurance study profiles. If the difference is greater than 1 foot, then the community should calculate the difference. For example, if the ordinance requires 1 foot of freeboard above the 500-year flood and the profiles show that the 500-year flood averages 1.5 feet above the 100-year flood, then FB = 1.0 + 1.5 = 2.5 and FRB = 100 x 2.5 = 250.

5. For FRB credit outside of V Zones, if the ordinance uses "lowest horizontal structural member" or similar language instead of "lowest floor," add 1.0 to FB.

The minimum NFIP requirement outside of coastal high hazard areas (V Zones) is that the top of the lowest floor must be at or above the base flood elevation. Some communities require that any beams, floor joists, or other horizontal structural members be elevated to or above the base flood elevation. Since this requirement will generally result in the top of the lowest floor being approximately 1 foot above the base flood elevation, the CRS provides credit equivalent to 1 foot of freeboard.



This credit is not available in coastal high hazard areas because it is a minimum NFIP requirement in V Zones. Communities that enforce this requirement in both A and V Zones must use the impact adjustment to pro-rate the credit points.

6. A community may use the following to receive more credit in AO1, AO2, and AO3 Zones

   (a) In AO1 and AO2 Zones, add 2.0 to FB.

   (b) In AO3 Zones, add 1.0 to FB.

NFIP Regulations:

44 *CFR* Sections 60.3(c)(7) and (8)

A community must

(7) Require within any AO zone on the community's FIRM that all new construction and substantial improvements of residential structures have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least two feet if no depth number is specified);

(8) Require within any AO zone on the community's FIRM that all new construction and substantial improvements of nonresidential structures (i) have the lowest floor (including basement) elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's FIRM (at least two feet if no depth number is specified), or (ii) together with attendant utility and sanitary facilities be completely floodproofed to that level . . .

AO Zones are floodplains subject to shallow flooding. The number after "AO" is the depth of flooding expected. Waves and other problems are minimal in such areas, so a little freeboard provides a relatively larger margin of protection. Section 431.a.6 increases the freeboard credit points in such areas.

In AO Zones, base flood depths are provided instead of base flood elevations in relation to mean sea level. Where depths are not provided, the NFIP regulations require new buildings to be

elevated 2 feet above grade. Some communities misinterpret this requirement as 2 feet of freeboard. Elevating 2 feet above the base flood elevation is a creditable freeboard requirement. Elevating 2 feet above grade in an AO Zone where no base flood elevation is provided is a minimum requirement of the NFIP and is not eligible for credit.

A community with a relatively large area of AO Zone may want to use the impact adjustment to calculate different values for FRB in different areas. For example, if the community has a 1-foot freeboard requirement, FRB = 100 x 1 = 100. However, if some of its floodplain is AO1 Zone, FB = 1 + 2 = 3 and FRB = 300. The community can receive 100 points for some of its floodplain and 300 points for the rest. The impact adjustment is discussed in Section 432 beginning on page 42.

7. If the requirement for freeboard is limited to areas where there are base flood elevations, or otherwise does not apply to all new construction, then an impact adjustment must be made using Option 2 or 3 (see Sections 432.b and 432.c).

If the freeboard requirement does not affect all buildings, then the Option 2 or Option 3 impact adjustment must be used. For example, many ordinances require freeboard only where a base flood elevation is provided. Others require freeboard only for elevated buildings (non-residential buildings may be floodproofed to the base flood elevation without freeboard). In these cases, the community can either identify and measure the areas affected for Option 3 or use Option 2. Impact adjustments are discussed in Section 432.

If the community has different freeboard standards in different areas, it may use the lowest value for FRB for all areas. This may eliminate the need for an Impact Adjustment Map and separate calculations for various values of FRB.

Example Regulatory Language. CRS credit for freeboard is based on how high new buildings and substantial improvements must be elevated or floodproofed. Freeboard language is in the section of the ordinance or law that addresses construction standards for new buildings.

There are two common regulatory approaches to freeboard. One that has circulated widely in some model ordinances requires the lowest floor to be elevated to the base flood elevation plus 1 or more feet. Often "plus 1 foot" is in parentheses because the model ordinance's authors wanted the community to insert their own level of freeboard. Some communities have adopted the language, parentheses and all, not realizing that it was an optional requirement more restrictive than the NFIP regulations.

1. *Residential Construction. New construction or substantial improvement of any residential building (or manufactured home) shall have the lowest floor, including basement, elevated no lower than (one feet) above the base flood elevation.*

2. *Non-Residential Construction. New construction or substantial improvement of any commercial, industrial, or non-residential building (or manufactured home) shall:*

a. Have the lowest floor, including basement, mechanical and utility equipment, elevated no lower than (one feet) above the level of the base flood elevation or

b. Be floodproofed to a level no lower than (one feet) above the level of the base flood elevation, provided that all areas of the building (including mechanical and utility equipment) below the required elevation are watertight with walls substantially impermeable to the passage of water, and use structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effects of buoyancy.

Using formula 1, FB = 1.0, FRB = 100 x 1.0 = 100.

The other common approach is to establish a "flood protection elevation," "regulatory protection level," or some similar elevation. The level is set at so many feet above the base flood elevation in the definitions section of the ordinance. The section on standards for new buildings simply requires protection to the "flood protection elevation" and there is no reference to a base flood elevation. If the community uses this approach, it must submit the ordinance language for both the definition and new construction standards.

3. Definitions: . . .

g. "FPE" or "Flood Protection Elevation" means: the elevation of the base flood plus two feet at any given location in the floodplain.

. . .

7. Standards for new construction

a. All new residential buildings shall be elevated so the lowest floor is at or above the FPE. All new non-residential buildings shall be either elevated above the FPE or floodproofed to the FPE.

Using formula 1, FB = 2.0, FRB = 100 x 2.0 = 200.

The example below is based on formula 5. The ordinance language results in the TOP of the first floor being 1 foot above the base flood elevation.

All buildings or structures that are erected within an A zone shall be elevated so that the lowest portion of all horizontal structural members that support floors, including floor slabs but excluding footings, pile caps, and pilings, are located at or above the base flood elevation.

Using formula 5, FB = 1.0, FRB = 100 x 1.0 = 100.

Common Problems. Some ordinances have the flood protection requirements located in several different places. There may be a section on construction of residential buildings, another one on non-residential buildings, one on manufactured housing, and a fourth section with standards for AO or V Zones. Full credit for freeboard is dependent on the requirement being applied to all buildings and in all areas of the floodplain.

The most common problem found in applications for FRB credit has been that the requirement was only put in the section that deals with elevating new buildings. Most ordinances have another section that allows non-residential buildings to be floodproofed to the base flood elevation. As this problem likely was an oversight by the authors of a model ordinance, it can be rectified by amending the ordinance to include freeboard for floodproofing.

If only elevated buildings are required to have freeboard, then the community cannot assure that non-residential buildings will have freeboard. Freeboard is more critical for floodproofed buildings because of the catastrophic results when the floodproofing is overtopped. Accordingly, where freeboard is only required for elevated buildings, an impact adjustment must be made.

Below is an example of ordinance language that only requires freeboard for elevated buildings. Because there is no freeboard requirement for floodproofed buildings, the credit is reduced under the impact adjustment.

There are two impact adjustments possible when freeboard is not required for all new buildings: Option 2 and Option 3. As explained in Section 432.b on page 42, under Option 2 the value for FRB is multiplied by 0.25 and the result is 25% of the full credit.

If the community can show that more than 25% of its floodplain will be developed with residential buildings, then it can use the Option 3 impact adjustment to receive more than 25% credit. For example, if the community's zoning ordinance shows that 90% of the floodplain is zoned for residential use, then the freeboard is in effect in 90% of the floodplain. The impact adjustment will result in 90% credit instead of 25% credit.

1. *Residential Construction. New construction or substantial improvement of any residential structure shall have the lowest floor, including mechanical and utility equipment, elevated to the base flood elevation plus one foot.*

2. *Non-Residential Construction. New construction or substantial improvement of any commercial, industrial, or other non-residential structure shall either have the have the lowest floor, including basement, elevated to the base flood elevation plus one foot, or, together with attendant utility and sanitary facilities shall be floodproofed so that below the base flood elevation the structure is watertight with walls substantially impermeable to the passage of water. . . . [underlining added]*

   Using Option 2, rFRB = 0.25, cFRB = 100.0 x 0.25 = 25

   Using Option 3 where 90% of the floodplain is zoned for residential use, rFRB = 0.9, cFRB = 100.0 x 0.9 = 90

Another problem results when a community adopts a model ordinance without checking to see if all the sections are locally applicable. For example, most models include sections on manufactured housing, whether or not they are allowed in the floodplain's zoning districts. If the manufactured housing language does not meet the FRB credit criteria, the community may show the ISO/CRS Specialist that that section from a model ordinance does not apply locally. Similarly, the community may not have any V or AO Zones on its FIRM.

Most ordinances only require buildings to be elevated where there is an established base flood elevation. Regulations in approximate A Zones may not require protecting new buildings to or above a base flood elevation and, therefore, there may not be a freeboard requirement. In such cases, the impact adjustment must use Option 2 or 3 unless the community can show that a base flood elevation is always provided and that buildings must be elevated above that level, plus freeboard, in all floodplains.

A different problem occurs when freeboard for buildings is confused with freeboard for levees or channel banks. Levee freeboard is discussed in Activity 620 (Levee Safety). There is no CRS credit for a freeboard requirement for new or modified channels.

Requesting FRB credit for an approach may duplicate other CRS credit. For example, a community may have a base flood elevation developed to more restrictive local mapping criteria. If the local flood elevation is 1 foot higher than the one provided by FEMA with the FIRM, the community may apply for either freeboard credit or for credit under Activity 410 (Additional Flood Data), but not for both.

b. Foundation Protection (FDN)

The NFIP regulations require that structures be elevated to or above the base flood elevation AND anchored to resist flotation, collapse and lateral movement. In V Zones and for floodproofed buildings, an engineer or architect must certify that the structure meets the NFIP requirements. In other situations, the regulations do not provide specific guidance as to how the performance standards are met.

Buildings elevated on pilings, crawlspaces, or other foundations may be damaged if the foundations are not properly designed for the soil and flood conditions of the site. Fill can erode during a flood, undermining the structure. Structural damage can also result from the settling of a building placed on improperly compacted fill or organic soils.

Foundation protection ("FDN") credit is provided to encourage communities to require site-specific foundation construction standards. FDN credit is not available in coastal high hazard areas because the minimum NFIP regulations require engineered foundations in V Zones. There are three approaches to regulating foundations.

> b. Foundation protection (FDN) (Maximum credit: 35 points). This credit is not available in V Zones because foundation protection is a minimum NFIP requirement in V Zones.

1. FDN = 35, if ALL new buildings must EITHER:

   (a) be constructed on properly designed and compacted fill (ASTM D-698 or equivalent) that extends beyond the building walls before dropping below the base flood elevation and has appropriate protection from erosion and scour. The design of the fill or the fill standard must be approved by a registered engineer. OR

   (b) meet the engineered support requirements similar to those for V Zones (44 *CFR* 60.3(e)(4)).

To receive the full 35 points, the regulations must address all new buildings on all types of foundations, e.g., on fill, crawlspaces, piers, etc. All new buildings must be built on either engineered fill or engineered supports.

ASTM (American Society for Testing and Materials) Standard D-698 requires compaction to 95% of the maximum density obtainable using the Standard Proctor Test method.

An engineer's certificate is not needed for each structure, although records of compaction tests, etc., would be needed for each structure. If the community has adopted an engineered standard and requires compliance with that standard, FDN credit is provided.

2. FDN = 20, if all new buildings built on fill must be constructed on properly designed and compacted fill (ASTM D-698 or equivalent) that extends beyond the building walls before dropping below the base flood elevation and has appropriate protection from erosion and scour.

This credit is for regulations that only address buildings on fill. Twenty points are provided, even though there are no special requirements for buildings on crawlspaces, piers, etc.. If the regulations require that ALL new and substantially improved buildings be built on engineered fill, then FDN = 35 under subsection b.1.

An engineer's certificate is not needed for each structure, although records of compaction tests, etc., would be needed for each structure. If the community has adopted an engineered standard and requires compliance with that standard, FDN credit is provided.

3. FDN = 10, if the community has adopted and enforces the soil testing and compaction requirements of the Standard, Uniform, or National Building Codes.

All three national model building codes have language relating to soils, compaction of fill, and construction of footings and piles. They do not address protecting the fill form erosion, scour and other flood hazards. The model codes' provisions are found in the following sections:

- Chapter 13, "Foundations," in the *Standard Building Code* (1991 edition) developed by the Southern Building Code Congress International (SBCCI) (known as Chapter 18 in the 1994 and 1996 editions).
- Chapter 29, "Excavations, Foundations, and Retaining Walls," and Chapter 70, "Excavation and Grading," of the *Uniform Building Code* (1991 edition) of the International Conference of Building Officials (ICBO) (Chapters 18 and 33 in the 1994 edition).
- Article 18, "Foundations and Retaining Walls," of the Building Officials and Code Administrators (BOCA) *National Building Code* (1993 edition).

Communities that have adopted these sections of these model codes are provided 10 points for foundation protection (FDN).

NFIP Requirement. The NFIP regulations do not specifically require that foundations or fill be protected from erosion, scour, or settling. However, this requirement is implicit in the performance standard of Section 60.3(a)(3), which requires that the community make sure that buildings are properly designed and anchored to resist flood damage:

> **NFIP Regulation:**
>
> 44 *CFR* Section 60.3(a)(3)
>
> (3) . . . If a proposed building site is in a flood-prone area, all new construction and substantial improvements shall (i) be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy . . .

As quoted on page 7 relating to freeboard, Sections 60.3(c)(2) and (3) require buildings to be elevated or, in the case of non-residential buildings, elevated or floodproofed. Communities are required to maintain copies of elevation certificates prepared by surveyors or engineers to ensure that this requirement is met (Section 60.3(b)(5)). Section 60.3(c)(4) requires an engineer's or architect's certificate if the building is floodproofed.

> **NFIP Regulation:**
>
> 44 *CFR* Section 60.3(b)(4)
>
> A community must
>
> (4) Provide that where a non-residential structure is intended to be made watertight below the base flood level, (i) a registered professional engineer or architect shall develop and/or review structural design, specifications, and plans for the construction, and shall certify that the design and methods of construction are in accord with accepted standards of practice for meeting the applicable provisions.

A building elevated on solid foundation walls must have openings in the walls to allow passage of flood water to equalize hydrostatic pressure on the walls.

NFIP Regulation:

44 *CFR* Section 60.3(c)(5)

A community must

(5) Require, for all new construction and substantial improvements, that fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria . . .

Because these regulations relate to foundations and because they require architect or engineer certificates, some communities have confused these minimum requirements with FDN credit. FDN credit is related to compaction of the supporting soils and protection of the soils or supporting members from erosion, scour, settling, and related hazards that accompany floods.

The NFIP only requires engineered foundations in coastal velocity (V) zones. The community must obtain an engineer's or architect's certification that the performance standards are met:

NFIP Regulation:

44 *CFR* Section 60.3(e)(4)

(4) Provide that all new construction and substantial improvements in Zones V1–30 and VE, and also Zone V if base flood elevation data is available, on the community's FIRM, are elevated on pilings and columns so that (i) the bottom of the lowest horizontal structural member of the lowest floor (excluding the pilings or columns) is elevated to or above the base flood level; and (ii) the pile or column foundation and structure attached thereto is anchored to resist flotation, collapse and lateral movement due to the effects of wind and water loads acting simultaneously on all building components. Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards. A registered professional engineer or architect shall develop or review the structural design, specifications and plans for the construction, and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for meeting the provisions of (e)(4)(i) and (ii) of this section.

Scoring. FDN is worth up to 35 points. Full credit is provided only if ALL new buildings must meet one of the two foundation protection requirements listed under b.1(a) and b.1(b) on page 14. If an ordinance adopts both standards (leaving it up to the builder to decide on the type of foundation), then full credit is provided. However, if the community requires engineered fill but has no special requirement for buildings that are not built on fill, then FDN = 20 under b.2.

Credit for FDN is not available in V Zones because the NFIP regulations prohibit fill for structural support and require foundation certificates in V Zones (Sections 60.3(e)(2), (4), and (6)). Unless the community's V-Zone foundation requirements exceed these NFIP requirements, it must use the impact adjustment to calculate its credit for the portion of the regulatory floodplain outside the V Zone.

Example Regulatory Language.

> *A registered professional engineer or architect shall develop or review the structural design, specifications and plans for the foundation of the building and shall certify that the design and methods of construction are in accordance with accepted practices to withstand flotation, collapse, lateral movement, erosion and scour, undermining, and the effects of water and wind acting simultaneously on all building components during the base flood.*
>
> **FDN = 35**

Common Problems. The most common reason for denial of FDN credit has been submittal of ordinance language that was adopted to meet the minimum NFIP requirements listed on the previous page. Because these regulations relate to foundations and because they require architect, engineer, or surveyor certificates, some communities have confused these minimum requirements with FDN credit.

Some communities have excellent compaction and erosion protection standards for placing fill in the floodplain. However, this requirement does not apply to buildings built on elevated foundations without filling. Instead of providing the full 35 points credit, FDN = 20.

c. Cumulative Substantial Improvement Rules (CSI)

Floodplain management regulations are most effective in reducing flood damage to new construction. Buildings built before adoption of the regulations are often subject to repeated flooding, repeated damage, and repeated flood insurance claims and federal disaster assistance payments.

The NFIP regulations address a portion of this problem by requiring that substantially damaged and substantially improved buildings be brought up to the same standards as new buildings. However, only a small percentage of the existing buildings are substantially damaged or substantially improved and subject to these requirements.

NFIP Requirement. Substantial improvements are treated as new construction in Section 60.3(c)(2) and (3), quoted on page 7. Section 59.1 defines substantial damage and substantial improvement.

NFIP Regulation:

44 *CFR* Section 59.1

"Substantial damage" means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

"Substantial improvement" means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "substantial damage," regardless of the actual repair work performed. . . .

A single large improvement or repair project is clearly a substantial improvement no matter how many separate permits are issued. However, the NFIP regulations do not require that smaller individual improvements made over a period of years and that add up to 50% be considered a substantial improvement. Theoretically, property owners could "beat the system" by applying for a 40% improvement project one year and applying for another 40% project the next year.

Communities can reduce flood damage by counting improvement and repair projects cumulatively so that buildings will be brought into compliance with flood protection standards sooner. The CRS provides credit for communities that do this. Credit is provided under CSI for enforcing a cumulative substantial improvement rule.

FEMA has published additional guidelines on substantial improvement regulations in *Answers to Questions About Substantially Damaged Buildings*, FEMA-213, May 1991 (see page 51).

Scoring. This element provides credit to communities that ensure that the total value of all improvements permitted over the years does not exceed 50% of the value of the structure at the time the regulation went into effect. If it does, the original building must be protected according to the NFIP requirements for new buildings.

Scoring allows for separate regulatory requirements for improvements and repairs. If the community requires both to be counted cumulatively, it receives the total for c.1 and c.2. It can also add the credit for c.3, which covers all additions, regardless of size.

c. Cumulative substantial improvement rules (CSI) (Maximum credit: 110 points)

CSI is the total of the following points:

1. One of the following:

   (a) 45, if the regulations require that improvements, modifications, and additions to existing buildings are counted cumulatively for at least 10 years, or

   (b) 25, if the regulations require that improvements, modifications, and additions to existing buildings are counted cumulatively for at least 5 years.

2. One of the following:

   (a) 45, if the regulations require that reconstruction and repairs to damaged buildings are counted cumulatively for at least ten (10) years, or

   (b) 25, if the regulations require that reconstruction and repairs to damaged buildings are counted cumulatively for at least five (5) years, or

   (c) 20, if the community adopts regulatory language that qualifies properties for Increased Cost of Compliance insurance coverage for repetitive losses.

Increased Cost of Compliance (ICC) is a relatively new provision in flood insurance policies that helps pay for bringing a substantially damaged flooded building into compliance with the local ordinance. It is possible that a building deemed substantially damaged by an ordinance that qualifies for CSI would not qualify for an ICC payment. ICC and example regulatory language are discussed separately in the boxes on the next two pages.

3. 20, if the regulations require that any addition to a building be protected from damage from the base flood.

This third approach, worth 20 points, makes every addition, regardless of size, a substantial improvement. Additions within the footprint of the original building would have to be on a floor above the base flood elevation. Additions outside that footprint would have to be elevated (or, for non-residential structures, floodproofed) above the base flood elevation.

Example Regulatory Language. Most ordinances use the NFIP definition for substantial improvement as quoted on page 18. The underlining in the following example shows how language can be added to the definition to clarify that both repairs and improvements are counted cumulatively.

"Substantial improvement" means any <u>combination of repairs,</u> reconstruction, rehabilitation, addition, or other improvement of a structure, <u>taking place during the life of the structure</u> the <u>cumulative</u> cost of which equals or exceeds fifty percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures that have incurred "substantial damage," regardless of the actual repair work performed. . . .

CSI = 45 + 45 = 90.

If "*during the life of the structure*" was replaced with "*during a period of five years*," then CSI = 25 + 25 = 50.

If the words "*repairs, reconstructions*" were not included in the first example, CSI = 45. If not included in the second example, CSI = 25.

Increased Cost of Compliance

On June 1, 1997, the NFIP began offering "Increased Cost of Compliance" (ICC) coverage for buildings covered under the Standard Flood Insurance Policy (SFIP). ICC coverage provides for the payment of a claim to help pay for the cost to comply with community floodplain management ordinances after a flood event in which a building has been declared substantially damaged or repetitively damaged.

When an insured building is damaged by a flood and the community declares the building to be substantially or repetitively damaged, ICC will help pay for the cost to elevate, floodproof, demolish, or relocate the building up to a maximum of $15,000. This coverage is in addition to the building coverage for the repair of actual physical damage from flood under the SFIP. An ICC claim can be filed whether or not a community has received a Presidential disaster declaration.

The following conditions must be met for a substantially damaged building to be eligible for an ICC claim: A building is eligible for an ICC claim payment if it is in a Special Flood Hazard Area and if the community determines it has been damaged by a flood whereby the cost of restoring the building to its before-damaged condition would equal or exceed 50% of the market value of the building before the damage occurred, as determined by the community. All NFIP communities must have, at a minimum, a substantial damage provision in their floodplain management ordinance in accordance with the NFIP criteria.

CRS NOTE: *By statute, an ICC claim can only be paid upon a substantial damage determination based on the NFIP's 50% damage criteria. An ICC claim will not be paid if the damage is less than 50% of the market value, even if the local ordinance declares the building substantially damaged. Communities receiving LSI credit for lower substantial improvement thresholds need to be aware that there may be times when their higher regulatory standard will not trigger an ICC claim payment for their residents.*

The following conditions must be met for a repetitively damaged building to be eligible for an ICC claim payment: A building is eligible for an ICC claim payment if it is in a Special Flood Hazard Area and is a repetitive loss structure and is subject to a community floodplain management ordinance. Two conditions must be met for an ICC claim to be paid under the SFIP for a repetitive loss structure:

1. The state or community must have adopted and be currently enforcing a repetitive loss provision or a cumulative substantial damage provision requiring action by the property owner to comply with the community's floodplain management ordinance, and

2. The building must have a history of NFIP claim payments that satisfies the statute's definition of "repetitive loss structure". A repetitive loss structure means "a building covered by a contract for flood insurance that has incurred flood-related damage on 2 occasions during a 10-year period ending on the date of the event for which a second claim is made, in which the cost of repairing the flood damage, on the average, equaled or exceeded 25% of the market value of the building at the time of each such flood event." *Note that this statutory ICC definition is not the same as the CRS definition of a repetitive loss property.*

Increased Cost of Compliance (cont.)

The date on which the first loss occurred, even if the loss occurred before June 1, 1997, is immaterial to eligibility for an ICC claim payment, as long as the state or community enforced a repetitive loss or cumulative substantial damage requirement on the building and the insured building satisfies the definition of the "repetitive loss structure" defined above.

CRS NOTE: *Communities receiving CSI credit for a cumulative substantial improvement regulation must be aware that there may be instances in which the community's criteria may require compliance with its floodplain management ordinance, but the building may not qualify for an ICC claim payment (e.g., if a building is damaged three times, with each flood averaging 20% damage).*

Below are two options for ordinance language that is consistent with the definition of "repetitive loss structure" under the NFIP. The language would receive 20 points under CSI—fewer points than the more restrictive language of 431.c.1(a) and (b).

Additional guidance on ICC coverage can be found in the *National Flood Insurance Program Interim Guidance for State and Local Officials—Increased Cost of Compliance Coverage, FEMA 301/September 1997* and at FEMA's Website" http://www.fema.gov/library/lib06.htm.

Option 1:

A. Adopt the Following Definition:

"Repetitive Loss" means flood-related damage sustained by a structure on two separate occasions during a 10-year period for which the cost of repairs at the time of each such flood event, on the average, equals or exceeds 25% of the market value of the structure before the damage occurred.

B. And modify the "substantial improvement" definition as follows:

"Substantial Improvement" means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure before the "start of construction" of the improvement. This term includes structures that have incurred "repetitive loss" or "substantial damage," regardless of the actual repair work performed.

Option 2: Modify the "substantial damage" definition as follows:

"Substantial Damage" means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50% of the market value of the structure before the damage occurred. Substantial damage also means flood-related damage sustained by a structure on two separate occasions during a 10-year period for which the cost of repairs at the time of each such flood event, on the average, equals or exceeds 25% of the market value of the structure before the damage occurred.

NOTE: *An ICC Claim Payment is ONLY made for flood-related damage. The substantial damage part of the definition must still include "damage of any origin" to be compliant with the minimum NFIP Floodplain Management Regulations.*

Common Problems. As with foundation protection, the most common problem with this element is submittal of ordinance language based on the minimum requirements of the NFIP. Many ordinances use the very same language from Section 59.1 quoted on page 18. The following is from a frequently used model ordinance.

> *"Substantial improvement" means any reconstruction, rehabilitation, addition, or other improvement of a structure the cost of which equals or exceeds fifty percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures that have incurred "substantial damage," regardless of the actual repair work performed. For the purposes of this definition, "substantial improvement" is considered to occur when the first alteration of any wall, ceiling, floor, or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure.*
>
> **CSI = 0**

As it is written, the above language would NOT receive any credit under CSI because it does not clearly state that improvements are counted cumulatively. However, many communities use this ordinance language and have been enforcing cumulative rules. CSI credit has been granted when the community submits a legal opinion or directive from the community's legal counsel stating how the ordinance is to be interpreted. The following is an example from a letter from a city attorney to the local permit office.

> *It is my opinion that [the last sentence in the above ordinance] is significant in terms of evidencing an intent on the part of the drafters of such provision that all alterations, beginning with the first alteration of the structure are to be considered in arriving at a determination of whether a substantial improvement, under the regulation, has occurred. Accordingly, it is my opinion that substantial improvement requires a consideration of all improvements to the premises occurring subsequent to the effective date of application of the provisions within the City. . . .*
>
> **CSI = 45 + 45 = 90**

Another problem is keeping track of improvements over time. The system used to enforce this and the other credited elements is reviewed by the ISO/CRS Specialist during the verification visit. Some communities throw out permit records one year after the certificate of occupancy is issued. Others file them in a basement and cannot get to them readily.

The community needs to maintain permit records by parcel number or address, so that the history of improvements to a particular structure is checked before the next permit is issued. For example, at the time of permit application, the address could be checked in a computer-based tracking system to see what previous permits had been issued.

Full credit of 45 points requires a system that will keep track of improvements for at least 10 years. Less credit (25 points) is provided if records are accessible for at least five years. On the next page is an example format for a paper tracking system.

Building Improvement Record

Property address: 421 Addington Dr. PIN: 16-321-417-83-2 .

Type of project: Room addition .

Permit number: 89-313 Date: 9/20/89 Cost of project:[1] $ 18,000 .

Assessed value of building: $ 50,000 Market value:[2] $ 100,000 .

Cost of project divided by market value: 18 %

Type of project: Repairs of fire damage .

Permit number: 91-114 Date: 3/6/91 Cost of project:[1] $ 25,000 .

Assessed value of building: $ 55,000 Market value:[2] $ 110,000 .

Cost of project divided by market value: 23 % Total percentage to date:[3] 41 %

Type of project: Remodeling, install fireplace, move walls .

Permit number: 94/-16 Date: 6/2/94 Cost of project:[1] $ 6,000 .

Assessed value of building: $ 58,500 Market value:[2] $ 17,000 .

Cost of project divided by market value: 5 % Total percentage to date:[3] 46 %

Type of project: _____

Permit number: _____ Date: _____ Cost of project:[1] $ _____ .

Assessed value of building: $_____ Market value:[2] $ _____ .

Cost of project divided by market value: ____% Total percentage to date:[3] ____%

1. The cost of the project must be the true cost, including the value of donated materials, owner's labor, etc., based on prevailing construction costs and wages in the area. The cost of repairing a damaged building must be the cost to return it to its pre-damaged condition, regardless whether the owner intends to repair or rebuild everything that was damaged.

2. In this community, buildings are assessed at 50% of their market value. Therefore, market value = assessed value x 2. Market value calculated by a professional appraiser shall take precedence over this approach to basing market value on assessed value.

3. Total percentage to date is the sum of the cost of project divided by market value for all previous projects. When the total percentage to date equals or exceeds 50%, the project is considered a substantial improvement.

d. Lower Substantial Improvement Threshold (LSI)

Another way to bring more buildings into compliance with the standards for new construction is to use a lower number than 50% in the substantial improvement requirement. A building is more likely to be brought up to code sooner if the threshold is, say, a 25% improvement or repair project.

NFIP Requirement. The NFIP requirement of 50% is part of the definition of "substantial improvement" in Section 59.1, which is quoted on page 18.

Scoring. LSI credit is based upon the regulatory threshold. Use either

1. 90, if the regulatory threshold is less than 10%;
2. 70, if the regulatory threshold is 10% to 24%;
3. 50, if the regulatory threshold is 25% to 39%;
4. 30, if the regulatory threshold is 40% to 44%;
5. 10, if the regulatory threshold is 45% to 49%; or
6. 20, if the regulatory threshold is no more than 25% of the bulk or square footage of the building's first floor.
7. If the lower substantial improvements threshold applies to EITHER improvements, modifications, and additions OR reconstruction and repairs, but not both, the value for LSI is multiplied by 0.5.

If a community lowered the threshold only for repairs and reconstruction or only for improvements, modifications and additions, then the value for LSI is halved. For example, if a community had the basic NFIP substantial improvement language but required that if a building is flooded and the value of repairs is greater than 25% of the pre-flood value of the building, then the building is considered substantially damaged, LSI = 50 x 0.5 = 25

Example Regulatory Language. Since communities participating in the NFIP already have a threshold, it is only necessary to change "50%" in the example language provided in the previous section to a lower number. The following is alternative language for cumulative substantial improvements (CSI), which also has a lower threshold (LSI).

> *A non-conforming building in a Flood Plain District may be altered, enlarged, or extended, on a one-time-only basis, provided the cost of such alterations, enlargements, or extensions does not equal or exceed 40 percent of its pre-improvement market value, unless such building is permanently changed to a conforming structure.*

Any non-conforming building in a Flood Plain District that is damaged by flood, fire, explosion, Act of God, the public enemy or other cause may be restored to its original dimensions and conditions, provided the cost of restoring the building to its before damage condition does not exceed 40 percent of its pre-damage market value, excluding the value of the land.

Threshold = 40%, LSI = 30 CSI = 90

Common Problems. Some states do not allow a more restrictive threshold. A community must be sure that a minimum threshold is not set by state law before it adopts a lower one.

Some ordinances appear to have a threshold of zero because they prohibit all improvements. However, they often have language that allows minor projects (e.g., valued at less than 10%) over a 12-month period. In those cases, the credit for LSI is zero because, without a cumulative substantial improvement requirement, the building could be more than 50% improved in six years.

e. Protection for Critical Facilities (PCF)

A critical facility is any property that, if flooded, would result in severe consequences to public health and safety. A list of facilities that should be included in a definition is provided in Section 130, Glossary, in the *Coordinator's Manual*. The list includes, but is not limited to:

- Those structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, and/or water-reactive materials;

- Hospitals, nursing homes, and housing likely to contain occupants who may not be sufficiently mobile to avoid death or injury during a flood;

- Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for flood response activities before, during, and after a flood; and

- Public and private utility facilities that are vital to maintaining or restoring normal services to flooded areas before, during and after a flood.

A higher level of protection for critical facilities serves several purposes: it reduces damage to vital public facilities, it reduces pollution of flood waters by hazardous materials, and it ensures that the facilities will be operable during most flood emergencies. Therefore, the CRS provides credit for regulations that protect critical facilities from the 500-year flood.

On older FIRMs, the 500-year floodplain is shown as a B Zone. Ordinance language can simply specify the types of facilities that are prohibited from or protected within the A, V, and B Zones. On newer FIRMs the 500-year floodplain is the shaded X Zone. Flood insurance study profiles should provide 500-year flood elevations.

NFIP Requirement. The NFIP regulations do not have any provisions for critical facilities other than that all buildings must be protected from damage by the 100-year flood. However, guidelines for implementing federal Executive Order 11988 set the 500-year flood as the standard for protecting "critical actions." This is the source of the CRS credit criteria.

Scoring. The score for PCF is based on how critical facilities are protected from the 500-year flood. It is either:

1. PCF = 100, where new critical facilities are prohibited from the 500 year floodplain; or
2. PCF = 50, where new and substantially improved critical facilities are required to be protected from damage and loss of access as a result of the 500-year flood or the flood of record, whichever is higher.

If an ordinance prohibits or regulates critical facilities in only part of the floodplain, such as in the floodway or V Zone, then the credit points are adjusted through the impact adjustment.

Note that credit is provided only if there is regulatory language that addresses protection of critical facilities. The fact that there are currently no critical facilities in the regulated floodplain may indicate community policy, but adopted regulations are required for PCF credit.

Example Regulatory Language.

Critical facilities shall be constructed on properly compacted fill and have the lowest floor (including basement) elevated at least one foot above the elevation of the 500-year flood. A critical facility shall have at least one access road connected to land outside the 500-year floodplain which is capable of supporting a 4,000 pound vehicle. The top of the road must be no lower than six inches (6") below the elevation of the 500-year flood.

PCF = 50

Common Problems. Some communities have submitted regulatory language that prohibits hazardous materials storage or one other type of critical facility. These have not received full PCF credit because they do not include the majority of critical facilities.

f. Protection of Floodplain Storage Capacity (PSC)

Although a building built on fill and elevated above the base flood elevation meets the NFIP regulations, filling a substantial portion of the floodplain reduces storage for flood water and tends to increase peak flows downstream. Prohibiting fill, or requiring that if fill is placed in the floodplain, an equal volume of storage be made available, will reduce this problem.

NFIP Requirement. The basic NFIP requirement in riverine situations is that new development must not restrict conveyance of flood waters. A floodway is adopted to identify the area needed to convey the base flood and that area is kept free of obstructions (Sections 60.3(c)(10) and (d)(2) and (3)).

NFIP Regulation:

44 *CFR* Section 60.3(d)(3)

A community must

(3) Prohibit encroachments, including fill, new construction, substantial improvements, and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge.

The balance of the floodplain, the fringe, may be filled or otherwise developed. Although the NFIP requirement has an important impact on future flood heights, it does not account for the loss of floodplain storage caused by allowing the fringe to be filled.

Storage is especially important in flat areas with wide fringes. Much of the slow moving flood water is held in the fringe during a flood. Filling or construction of a levee that removes the storage capacity of the fringe means more water will be sent downstream, resulting in increased flood heights. On the other hand, in many places, building on fill is the safest form of floodplain construction, so communities should not summarily enact an ordinance just for CRS credit.

Scoring. Floodplain storage capacity can be preserved in two ways. The first is to simply prohibit fill, the major cause for loss of storage. Prohibiting fill will also prevent most floodplain development and will help preserve the natural and beneficial functions of the floodplain.

The other method is to require compensatory storage, i.e., the developer must compensate for each cubic foot of fill, building, or other item that is displacing flood water. Generally, this is done by removing an equal volume of fill from the lot, usually at the same elevation to maintain the same hydraulic conditions.

The credit for PSC is based on which approach is used.

1. 80, where regulations prohibit fill within floodplains or flood fringes, including construction of buildings on fill; or
2. 70, where regulations require that new developments provide compensatory storage at hydraulically equivalent sites.

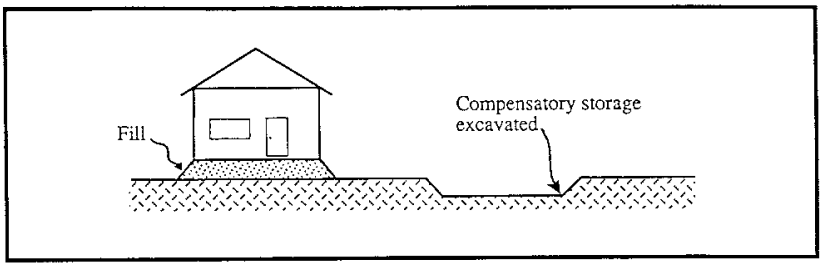
Example Regulatory Language.

Whenever any portion of a floodplain is authorized for development, the volume of space occupied by the authorized fill or structure below the base flood elevation shall be compensated for and balanced by a hydraulically equivalent volume of excavation taken from below the base flood elevation. All such excavations shall be constructed to drain

freely to the watercourse. No area below the waterline of a pond or other body of water can be credited as a compensating excavation.

PSC = 70

There is another example on pages 46–47, which would also receive 70 points.



CROSS-SECTION VIEW

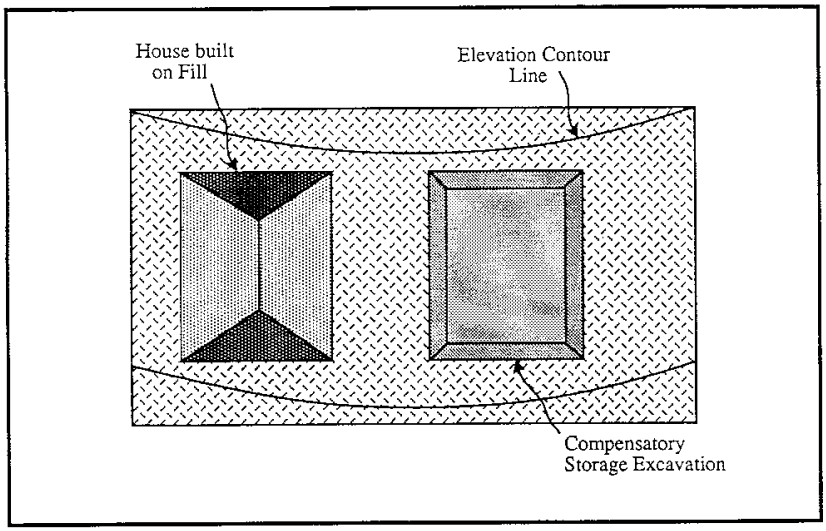


Illustration from the explanation of the King County, Washington, compensatory storage requirement. If fill is placed in the floodplain, an equal amount must be removed from the same elevation to provide "a hydraulically equivalent volume of excavation."

Common Problems. Some communities submit the section in their floodplain management ordinance that prohibits encroachments, including fill, from the floodway. This language is the minimum NFIP requirement from Section 60.3 (d)(3), quoted on page 27. Therefore, no credit is provided.

Further, credit is not provided for protection of storage capacity in floodways only. The minimum NFIP requirement that prohibits encroachments in floodways generally preserves the storage that floodways provide. PSC is primarily effective in fringe areas.

g. Natural and Beneficial Functions Regulations (NBR)

While regulations that protect natural and beneficial floodplain functions do not directly impact on protecting insurable buildings, they have an indirect flood protection benefit and they have a direct impact on related floodplain management concerns, such as water quality. Accordingly, the CRS recognizes three types of regulations related to protecting natural and beneficial functions:

1. Regulations that protect public health or water quality,
2. Regulations that protect shorelines, channels, and banks from disruption and erosion, and
3. Regulations adopted pursuant to a Habitat Conservation Plan.

Many communities protect natural and beneficial functions by prohibiting development in sensitive areas, such as wetlands, riparian areas, or habitats, or by requiring setbacks from channels or sensitive areas. Regulations that prohibit development from certain areas usually receive more credit points under Activity 420 (Open Space Preservation). Regulations that allow development but have additional requirements related to protecting natural and beneficial functions are credited under this activity.

NFIP Requirement. There is no NFIP requirement to protect water quality or to minimize disruption to shorelines, channels, and banks. There is a requirement related to maintaining channel capacity that many communities have in their floodplain regulations. Because communities are required by the NFIP requirement to do this, a requirement to maintain the carrying capacity of channels is not eligible for CRS credit.

NFIP Regulation:

44 *CFR* Section 60.3(b)(6) and (7)

A community must

(6) Notify, in riverine situations, adjacent communities and the State Coordinating Office prior to any alteration or relocation of a watercourse, and submit copies of such notifications to the Administrator;

(7) Assure that the flood carrying capacity within the altered or relocated portion of any watercourse is maintained.

Scoring. There are three bases for credit points for NBR:

1. prohibiting activities that are hazardous to public health or safety,
2. protecting shorelines and stream banks, and
3. regulating pursuant to a Habitat Conservation Plan

The points are cumulative, so a community can receive up to 40 points for doing all three:

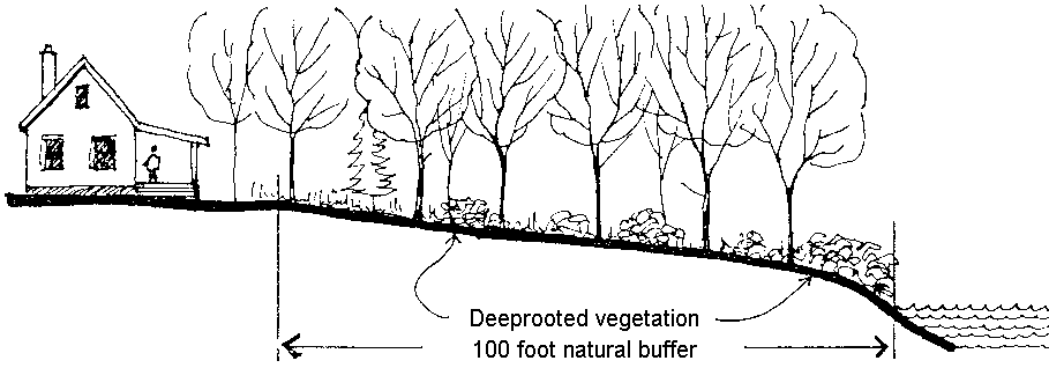
1. (a) 10, where regulations prohibit all activities in the floodplain that may be hazardous to public health or water quality; or

   (b) 5, where regulations prohibit one or two specific activities in the floodplain that may be hazardous to public health or water quality, such as sanitary landfills or septic systems.

Under section 1(a), 10 points are provided for prohibiting all hazards to public health or water quality. Under section 1(b), half of the credit, 5 points, is provided for prohibiting only some of those hazards, such as septic systems or sanitary landfills. Prohibiting hazardous materials, such as chemical storage, is credited under Section 431.e, Protection for Critical Facilities.

2. 15, where regulations require new floodplain developments to avoid or minimize disruption to shorelines, stream channels, and their banks.

Section g.2. credits allowing development but preventing channel modifications and other disturbances to river, stream, or ditch channels and lake and ocean shores. A setback requirement that prevents development from an area adjacent to a channel or shoreline should receive more credit under Activity 420 (Open Space Preservation).



Requiring a vegetated buffer strip can qualify for NBR credit.
Source: ***Environmental Management: A Guide for Town Officials,***
Maine Department of Environmental Protection, 1992

3. 15, for regulations adopted pursuant to a Habitat Conservation Plan approved by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service.

Community-wide Habitat Conservation Plans are "broad-based, landscape level planning tools" that identify steps that reduce conflicts between land development activities and the need to protect threatened or endangered species. They can prove very useful in providing ways for development to comply with the Endangered Species Act and to reduce the costs of conservation activities on individual property owners.

More information on habitat conservation plans can be found in *Habitat Conservation Planning Handbook*, U.S. Fish and Wildlife Service and National Marine Fisheries Service, November 1996. See Appendix F in the *CRS Coordinator's Manual* for the appropriate office of the Fish and Wildlife Service.

Example Regulatory Language.

Only those activities listed below are allowed within the floodplain district:

(a) Public flood control structures and other public works relating to the control of drainage, flooding, erosion, or water quality or habitat for fish and wildlife . . .

(c) Storm sewer and drainage ditch outfalls . . .

(e) Public open space and recreational facilities (without buildings or restrooms) . . .

NBR = 10 if there is a specific list of allowed or permitted activities that does not include uses that are hazardous to public health or water quality. Note that if the regulatory language prohibits all buildings and filling, it could qualify for more points under Activity 420 (Open Space Preservation). If so, NBR = 0, because the same provision cannot be credited twice.

For all activities involving construction within 25 feet of the channel, the following criteria shall be met:

(a) A natural vegetation buffer strip shall be preserved within at least 25 feet of the ordinary high water mark of the channel.

(b) Where it is impossible to protect this buffer strip during the construction of an appropriate use, a vegetated buffer strip shall be established upon completion of construction.

(c) The use of native riparian vegetation is preferred in the buffer strip. Access through this buffer strip shall be provided for stream maintenance purposes.

NBR = 15

h. Enclosure Limits (ENL)

Most new buildings constructed in floodplains are elevated. If the building is on an elevated foundation, rather than on fill, the area below the first floor must be kept open to allow flood waters to flow inside and equalize hydrostatic pressures on the walls. Where flood depths exceed 5 or 6 feet, builders often elevate the lowest floor 8 feet above grade. This allows the lower area to be used for parking and storage.

In coastal high hazard areas (V Zones), new buildings must be elevated on open foundations to present the minimum obstruction to breaking waves. Owners are allowed to have "breakaway walls," i.e., walls that will be knocked down by waves rather than remain to transfer the impact of the waves to the structure.

One problem that has arisen is that owners enclose the lower areas of elevated buildings and put materials in them that are subject to flood damage. Owners forget (or new owners are not aware of) the reason for keeping the lower areas open and free from items that can be damaged by a flood. The open areas become enclosed or the breakaway walls become solid and the interior is converted to family rooms, bedrooms, and even bathrooms.

Some communities and states know that this will happen and have adopted regulatory language that prevents enclosing the area below the regulatory flood elevation. This can be in the form of prohibiting all enclosures, limiting walls to a percentage of the surface area, or allowing only transparent walls, such as screening and open lattice-work.

Regulations to limit enclosures below the base flood elevation have two objectives. First, they minimize a potential source of debris that may hit other buildings. Second, they discourage finishing the area below the base flood elevation and storing valuable or hazardous items there.

The community may opt to enforce these enclosure limits only where the lowest floor is more than five feet above grade. Where the lowest floor is less than five feet above grade, a crawlspace with the proper openings may be more appropriate than an open area elevated on columns or piles. With less than five feet in height, the lower area is not likely to be improved or modified into a livable space and the enclosure limits are not needed.

NFIP Requirement. The NFIP prohibits all enclosures except breakaway walls in coastal high hazard areas (V Zones).

NFIP Regulation:

44 *CFR* Section 60.3(e)(5)

In V Zones, a community must

(5) Provide that all new construction and substantial improvements within Zones V1–30, VE, and V on the community's FIRM have the space below the lowest floor either free of obstruction or constructed with non-supporting breakaway walls, open wood lattice-work, or insect screening intended to collapse under wind and water loads without causing collapse, displacement, or other structural damage to the elevated portion of the building or supporting foundation system.

In non-coastal areas, the lower area of a building may be enclosed providing it has openings large enough to allow free passage of flood water.

NFIP Regulation:

44 *CFR* Section 60.3(c)(5)

A community must

(5) Require, for all new construction and substantial improvements, that fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria: A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, valves, or other covering or devices provided that they permit the automatic entry and exit of floodwaters.

Scoring. CRS credit is provided for regulations that exceed the above requirements. There are three ways the requirement can be scored:

1. 300, if regulations prohibit ANY building enclosures, including breakaway walls, below the base flood elevation; OR

2. The total of the following points:

   (a) 100, if regulations prohibit enclosures of areas greater than 300 square feet, including breakaway walls, below the base flood elevation. The area enclosed must still meet all NFIP requirements for openings, anchoring, and flood-resistant materials.

   (b) 50, if regulations require that the owner of a building sign a nonconversion agreement, promising not to improve, finish, or otherwise convert the area below the lowest floor and granting the community the right to inspect the enclosed area.

The prohibition includes prohibiting breakaway walls. They are enclosures that obstruct the vision of anyone who needs to verify whether the lower area has been modified. If prohibiting breakaway walls in V Zones is the only basis for credit, the area affected (the V Zone) must be reflected in the score by using Option 2 or Option 3 for the impact adjustment (see Section 433).

Example Regulatory Language.

New construction or substantial improvements of elevated buildings that include enclosed areas formed by foundation and other exterior walls shall be designed to preclude finished living space below the base flood elevation by providing openings in each wall having a total net area of not less than 50% of the total wall area subject to flooding. At least one opening per wall shall be no higher than one foot above grade to allow for the entry and exit of floodwaters to automatically equalize hydrostatic flood forces on the exterior walls.

This requirement calls for keeping the walls at least 50% open. "Openings" mean permanent openings, such as vents. Windows, doors, and garage doors do not qualify as "openings." Generally, this requirement is met by using lattice-work.

ENL = 300

<u>Elevated Buildings</u>. New construction or substantial improvements of elevated buildings that include fully enclosed areas formed by foundation and other exterior walls below the base flood elevation shall be designed to preclude finished living space and designed to allow for the entry and exit of floodwaters to automatically equalize hydrostatic flood forces on exterior walls.

(a) Designs for complying with this requirement must either be certified by a professional engineer or architect or meet the following minimum criteria:

(i) Provide a minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding;

(ii) The bottom of all openings shall be no higher than one foot above grade; and,

(iii) Openings may be equipped with screens, louvers, valves or other coverings or devices provided they permit the automatic flow of floodwaters in both direction.

(b) Access to the enclosed area shall be the minimum necessary to allow for parking of vehicles (garage door) or limited storage of maintenance equipment used in connection with the premises (standard exterior door) or entry to the living area (stairway or elevator); and

(c) The interior portion of such enclosed area shall not be partitioned or finished into separate rooms.

(d) The total floor area of all such enclosed areas shall not exceed 300 square feet.

ENL = 100. In the above example, all but section (d) is in a commonly used model ordinance. Section (d) limits the size of enclosures and is worth 100 points.

An elevated building with no lower level enclosure.
ENL = 300

An elevated building with lower-level openings and lattice-work coverings.
ENL = 300

If section (d) in the above example had stated:

(d) The owner shall sign an agreement to not convert the lower enclosed area to a use that is subject to water damage.

Then ENL = 50. An example nonconversion agreement appears on the next page.

Example Nonconversion Agreement

This DECLARATION made this ___ day of _____, 19__, by _____ _____ ("Owner") having an address at _____ .

WITNESSETH:

WHEREAS, the Owner is the record owner of all that real property located at _____ in the City of _____ in the County of _____, designated in the Tax Records as _____.

WHEREAS, the Owner has applied for a permit to place a structure on that property that has an enclosed area below the base flood elevation constructed in accordance with the requirements of Article _____ Section _____ of the Floodplain Management Ordinance of _____ ("Ordinance") and under Permit Number _____ ("Permit").

WHEREAS, the Owner agrees to record this DECLARATION and certifies and declares that the following covenants, conditions and restrictions are placed on the affected property as a condition of granting the Permit, and affects rights and obligations of the Owner and shall be binding on the Owner, his heirs, personal representatives, successors, future owners, and assigns.

UPON THE TERMS AND SUBJECT TO THE CONDITIONS, as follows:

1. The structure or part thereof to which these conditions apply is: _____ _____ .
2. At this site, the Base Flood Elevation is _____ feet above mean sea level, National Geodetic Vertical Datum.
3. Enclosed areas below the Base Flood Elevation shall be used solely for parking of vehicles, limited storage, or access to the building. All interior walls, ceilings and floors below the Base Flood Elevation shall be unfinished or constructed of flood resistant materials. Mechanical, electrical or plumbing devices shall not be installed below the Base Flood Elevation.
4. The walls of the enclosed areas below the Base Flood Elevation shall be equipped and remain equipped with openings as shown on the Permit.
5. The jurisdiction issuing the Permit and enforcing the Ordinance may take any appropriate legal action to correct any violation. Any alterations or changes from these conditions also may render the structure uninsurable or increase the cost for flood insurance.
6. A duly appointed representative of the City is authorized to enter the property for the purpose of inspecting the exterior and interior of the enclosed area to verify compliance with this Declaration. Such inspections will be conducted upon due notice to the Owner and no more frequently than once each year. More frequent inspections may be conducted if an annual inspection discovers a violation of the Permit.
7. Other conditions: _____

_____

In witness whereof the undersigned set their hands and seals this _____ day of _____, 19 __.

_____ _____

_____ (Seal) _____ (Seal)
Owner Witness

i. Other Higher Standard (OHS)

This element provides communities with credit for regulations that are not included elsewhere. Each submittal for credit is individually reviewed and scored.

NFIP Requirements. The National Flood Insurance Program sets minimum requirements in Parts 59 and 60 of Title 44 of the *Code of Federal Regulations*. Any regulatory requirement that is more restrictive than Parts 59 and 60 and that reduces flood losses or protects natural and beneficial floodplain functions can receive credit under this element.

A complete set of the current regulations in 44 *CFR* Parts 59 and 60 can be obtained from the FEMA Regional Offices listed in Appendix A of the *CRS Coordinator's Manual*. They are also summarized in Appendix D of the *Coordinator's Manual.*

Scoring. The credit points for each standard can vary from 1 to 25 depending on the regulations. There is a maximum of 50 points for all the other higher standards. Each submittal is scored by FEMA.

> OHS = up to 50 points for higher regulatory standards that prevent flood losses or protect natural and beneficial floodplain functions that are not otherwise credited in another element.

Examples of submittals that have been credited include:

- Requiring that all non-residential buildings be elevated (i.e., not allowing any new buildings to be floodproofed) (10 points).
- Requiring all new subdivisions to provide streets that will be no more than six inches under water during the base flood (10 points).
- Restricting enclosures in A Zones below elevated floors to less than 300 square feet (25 points).
- Prohibiting habitable structures in areas where the product of depth times velocity is greater than 18 (25 points).

Prohibiting residential structures and substantial improvements in floodways (25 points). If all structures and filling were prohibited, more credit would be provided under Activity 420 (Open Space Preservation).

j. Low density Zoning (LZ)

Low density zoning, like open space preservation, reduces the potential for flood damage by limiting the amount of development in the floodplain. It can also enhance natural and beneficial functions and maintain floodplain storage capacity.

Under this element, credit is provided for limiting development to no more than one building per acre. Credit increases as the allowable density decreases to one building per 10 acres. This credit is available for undeveloped land within low density zoning districts as well as for areas that are already developed in accordance with the density requirements.

Zoning an area for agriculture, conservation, or large residential lots preserves more open space than allowing more intensive development. For this element, it does not matter why an area is zoned for low density; what counts is the minimum lot size allowed in the zoning district. The credit is based upon the traditional zoning approach of setting minimum lot sizes for different zoning districts. The bigger the lot size, the less dense the floodplain development.

There are other approaches to minimizing the number of buildings allowed in a floodplain that are reviewed in *Subdivision Design in Flood Hazard Areas* (see page 38). These include density transfers, bonuses for avoiding the floodplain, planned unit developments, open space zoning, environmental overlay districts, and cluster development.

If a community's program uses a nontraditional approach to minimize the number of buildings allowed in the floodplain, the regulatory provision should be submitted for special scoring. If a community's regulatory program effectively prohibits new buildings from the floodplain, the community should apply for open space preservation credit under Activity 420.

NFIP Requirement. There is no requirement in the NFIP regulations related to density of land development.

Scoring. To calculate and apply for the credit points for low density zoning, separate activity worksheets, AW-430LZ and AW-431LZ, are used. The score, cLZ, is transferred to the regular worksheet for Activity 430, AW-431.

The maximum credit for this element is 83% of the credit provided for Activity 420 (Open Space Preservation), because some disruption and damage are expected even at a density of one building per 10 acres.

Credit is given for those portions of the floodplain subject to zoning rules that require a minimum of 1 acre per building or unit. Maximum credit is provided for a 10-acre or larger minimum lot size. In agricultural zones, the requirement may be calculated in terms of one residence per lot instead of one building per lot.

s = the minimum lot size in acres.

LZs = 60 x s

For credit calculation, density is measured in terms of acres per building. A zoning district with a minimum lot size of 2 acres allows a density of 2 acres per building. For this area, s = 2, and the area would be designated "LZ2" on the Impact Adjustment Map.

The variable "s" may have any value from 1.0 to 10.0. The highest allowable density is one building per acre (s = 1.0) and minimum lot sizes larger than 10 acres are credited as 10 acres (s = 10.0). Separate calculations are made for each zoning density, and the credits are added together in Section 433LZ.

Where minimum lot sizes are in units other than acres, they must be converted to acres to calculate the credit for this element. A minimum lot size from 40,000 to 43,560 square feet may be counted as 1 acre if the lots are exclusive of rights of way.

A minimum lot size required by a public health ordinance for septic tanks is not counted toward low density zoning. For example, an area with a zoning density of five structures per acre, where development is restricted due to lack of a sanitary sewer, may develop to its full potential if a sewer is installed. Credit is limited to areas that actually have a legal restriction on density.

Except in areas zoned for single family residential use, lot coverage must not exceed 10%, including buildings and fill. An industrial subdivision might allow only one structure per acre, but it might allow 90% lot coverage. This type of development would not meet the objectives of low density zoning credit for the CRS.

Example Regulatory Language. There are a variety of low density zones in many zoning ordinances. These may be conservation, agricultural, floodplain, "rural residential," "rural estates," or other zoning districts. The key part of the ordinance is the section on density or number of dwelling units per acre. Often this appears in a table or matrix that lists all the zones and the various setback, bulk, and density requirements for each.

Most state NFIP coordinating offices have prepared model ordinances with provisions that exceed the minimum NFIP standards. Additional help on regulatory provisions may be available from state planning or community affairs agencies and regional planning commissions.

More information on planning and regulatory techniques to preserve floodplain open space can be found in *Subdivision Design in Flood Hazard Areas,* Planning Advisory Service Report # 473. Copies can be ordered for $32 from

American Planning Association
122 South Michigan Ave., Suite 1600
Chicago, IL 60603
(312) 431-9100

Common Problems. Many applications have confused ordinances with plans. Floodplain management ordinances are sometimes submitted for credit under Activity 510 (Floodplain Management Planning). Conversely, sometimes a land use plan is submitted for credit for low density zoning. A land use or comprehensive plan is not a zoning ordinance and does not usually

have sufficient regulatory authority to qualify for credit. The discussion on page 5 offers some guidance on this issue.

k. Special Hazards Regulations (SH)

Special flood-related hazards are discussed in a separate publication, *CRS Commentary Supplement for Special Hazards Credit*. CRS credit is provided for regulations to protect future development from these hazards:

- Closed basin lakes
- Ice jams
- Land subsidence
- Coastal dunes and beaches
- Uncertain flow paths (e.g., alluvial fans and moveable bed streams)
- Mudflow hazards
- Coastal erosion
- Tsunamis

Different credit is provided for regulations tailored to each hazard. The credit points for the different regulations are totaled to obtain "cSH," the total credit for special hazards regulations. The *Supplement* describes the credit criteria for these regulations and additional publications provide more details about the hazards and management activities that can reduce damage. These publications can be ordered using the form in Appendix E of the *Coordinator's Manual*.

l. State-mandated Regulatory Standards (SMS)

This element recognizes the benefit received by the NFIP for a state-required measure that is implemented in both CRS and non-CRS communities in that state. State-mandated regulations also benefit from better staff training and state oversight than other regulatory provisions.

NFIP Requirement. There is no requirement in the NFIP regulations related to state standards, although the regulations encourage active state programs and more restrictive state standards.

Scoring. The credit is simply 10% of the verified points the community receives for the regulatory standard (before the impact adjustment). It only applies to standards credited in the 400 series of CRS activities.

> SMS = 0.1 x the equivalent credit for each state-mandated regulation credited in the 400 series of CRS activities. The total credit for all mandates cannot exceed 25.

The credit applies differently to different communities within a state, depending on the requirement. For example, only coastal communities receive SMS credit for a state requirement for a coastal setback line. The ISO/CRS Specialist is the best source of information on the SMS credit for a particular community.

Each submittal for credit is individually reviewed and scored with a value of 1 to 25 points. There is no credit if the activity is not verified locally. Examples of possible submittals include, but are not limited to:

- State-mandated freeboard (10% of the community's score for FRB)
- State floodway mapping standards (10% of the score for elements in Activity 410)
- State coastal setback regulations (10% of the credit for open space along the coast)

Example Regulatory Language. Because the credit is for mandated state regulatory standards, communities cannot adopt new regulatory language. The community must already have the standard incorporated in its ordinance. If the community has the option of adopting a state standard, it is not eligible for credit.

Common Problems. This element is new in 1999 so there is no CRS experience or known common problems.

m. Building Code and Staffing (BCS)

FEMA and the insurance industry have found that communities with building codes have better mitigation programs than those that do not have them. New construction is better protected from natural hazards and local regulatory programs are better managed.

The insurance industry initiated the Building Code Effectiveness Grading Schedule (BCEGS) to measure local building codes and their administration. BCEGS was developed and is operated by the Insurance Services Offices, Inc. (ISO), the same organization that verifies community CRS activities.

After it evaluates a community's building code and enforcement activities, ISO assigns each community a BCEGS grade of 1 (best) to 10 (no recognized program). When a smaller community's code enforcement program is administered by a larger jurisdiction, the smaller community will receive the larger jurisdiction's classification.

There are two ratings for each jurisdiction, commercial and personal (residential). If they are different, this element's credit is based on the lower of the two ratings. For example, if a community has a class 6 commercial BCEGS rating and a class 5 residential rating, the CRS considers it a class 6 BCEGS community.

If a community is in a state that does not have a formal BCEGS program, a courtesy review may be conducted to obtain an equivalent BCEGS class for CRS purposes. More information on BCEGS can be obtained from the Insurance Services Office through the ISO/CRS Specialists listed in Appendix G of the *CRS Coordinator's Manual*.

NFIP Requirement. There is no requirement in the NFIP regulations that a community have a building code or that staff be trained to a certain level.

Scoring. There are two bases for credit under this element: the community's BCEGS classification and whether the regulatory staff has had formal training or certification. The scores are added for the total points for BCS.

> BCS = the sum of the following:
>
> 1. 10 x (7 – BCEGS) where BCEGS is the class attained by the community under the Building Code Effectiveness Grading Schedule. There is no credit for BCEGS classes 7, 8, 9, or 10.

The first credit is determined by subtracting the BCEGS class from 7 and multiplying the result by 10. There is no credit for BCEGS classes 7, 8, 9, or 10. For example, if a community has a BCEGS class 4, BCS = 10 x (7 – 4) = 10 x 3 = 30.

> 2. 5 points if the person responsible for floodplain permits has graduated from an approved course or is a certified floodplain manager.

The second credit is provided if the person responsible for floodplain permits has graduated from the "Managing Floodplain Development through the National Flood Insurance Program" course taught at FEMA's Emergency Management Institute, the five-day field-deployed version of this course, the home study version of this course, or other equivalent training. More information on this course can be obtained from the Emergency Management Institute (1-800-238-3358) or the state emergency management agency's training office.

If the community is seeking credit for having the person responsible for floodplain permits graduated from the Emergency Management Institute's floodplain management course, a copy of the certificate of graduation must be provided. It should be noted that an Emergency Management Institute certificate of ATTENDANCE is not sufficient. A CERTIFICATE OF GRADUATION is provided only if the student passed the final examination.

The Association of State Floodplain Managers (ASFPM) and several states have created floodplain manager certification programs with requirements similar to the Emergency Management Institute course graduation criteria. The five points are also available if the staff person has been certified by ASFPM or by a state certification program that has been accredited by ASFPM. This credit will be removed if the staff person leaves the community or does not maintain his or her certification.

Example Regulatory Language. Because the credit is based the community's BCEGS classification and level of staff training, this element does not have example regulatory language.

Common Problems. This element is new in 1999 so there is no CRS experience or known common problems.

432 Impact Adjustment

The objective of the impact adjustment is to modify the credit points for an element that does not cover all of the community's flood problem. For this activity, the flood problem is considered to be the regulatory floodplain. The regulatory floodplain is the Special Flood Hazard Area (SFHA) shown as A and/or V Zones on the FIRM and any areas outside the SFHA that are subject to floodplain regulations. In most communities the regulatory floodplain is the SFHA.

The impact adjustment reduces an element's credit points if it is not enforced throughout the floodplain. It also allows accurate scoring where different areas of the floodplain are subject to different regulatory standards. Examples are different requirements for freeboard in coastal and riverine floodplains or different requirements for residential and non-residential buildings (see Common Problems on page 12).

Impact adjustment ratios are variables with a lower case "r" preceding the acronym for the element. The "r" stands for "ratio." For example, the acronym to reflect how much of the floodplain is covered by the freeboard requirement is "rFRB." In Section 433, the "r" variable is multiplied by the credit points for the element, so the higher the "r" value, the more credit points. The highest value for an impact adjustment ratio for Activity 430 is 1.0.

There is no impact adjustment for state-mandated regulatory standards (SMS) or Building code and staffing (BCS).

A community has three options for determining the values of the impact adjustment ratio. A community may use one option for some elements and another option for other elements. Options may not be mixed within an element.

a. Option 1

In most communities, most regulatory standards are enforced uniformly throughout the SFHA or the regulatory floodplain. Properties in different locations are not treated differently. In these cases, Option 1 should be used for the impact adjustment. Under Option 1, the credit points for an element are multiplied by 1.0, i.e., there is no reduction in credit points.

If a community applies for credit for Activity 420 (Open Space Preservation), it is saying that certain areas are preserved from development. Higher regulatory standards have no impact in those open space areas. Therefore, the impact adjustment ratios for these elements cannot be 1.0. The area affected by a regulatory standard must exclude areas designated as open space that are receiving OS credit under Activity 420 (Open Space Preservation).

The *CRS Coordinator's Manual* explains this scoring with formulae that use "XXX" to stand for the acronym of any element (e.g., "FRB," "CSI," etc.).

1. If new development within the entire area of the regulated floodplain (aRF) is regulated by an element, and no credit was requested for OS in Activity 420, the impact adjustment ratio for that element = 1.0 (rXXX = 1.0).

2. If new development within the entire area of the regulated floodplain (aRF) is regulated by an element, and credit was requested for OS in Activity 420, the impact adjustment ratio for that element = 1.0 - rOS (rXXX = 1.0 - rOS).

For example, if a community enforces its freeboard requirement throughout the regulatory floodplain, then the impact adjustment for FRB, rFRB, = 1.0. If the community applied for open space credit ("OS") under Activity 420 and the impact adjustment ("rOS") is 0.2, then rFRB = 1.0 - 0.2 = 0.8. In this example, the impact adjustment reflects the fact that 20% of the floodplain is open space where freeboard has no impact on future development.

If the community requires foundation protection to the V-Zone standards as described in Section 431.b, the V-Zone part of the regulatory floodplain must be excluded from the area affected by FDN. This precludes the use of Option 1 for rFDN in any community with V Zones.

b. Option 2

Where the higher regulatory standard is enforced in only some of the regulatory floodplain, the community must use either Option 2 or Option 3. These two options provide an impact adjustment of less than 1.0 because the element does not impact the entire floodplain.

Option 2 provides an automatic or default value for the impact adjustment. In this activity, the default value is 0.25. This means that no matter how large or small an area is covered by the regulatory standard, the credit points assume that 25% of the floodplain is affected. There is no modification to the impact adjustment if the community is receiving OS credit for preserving open space.

If new development within part of the area of regulated floodplain (aRF) is regulated by an element, default values of 0.25 may be used for the impact adjustment ratios (rXXX = 0.25).

Option 2 is used when a community does not want to calculate the areas affected using Option 3 or when the area affected is less than 25% of the floodplain.

> **Example.** Gulf Beach County requires two feet of freeboard in its V Zone (FRB = 200). The V Zone in this large county is much less than 25% of all of its SFHA, so it opts to use Option 2 rFRB = 0.25.

c. Option 3

Option 3 provides the most accurate impact adjustment for those elements that do not cover the entire floodplain. The impact adjustment ratio (the "r" variable) is calculated by dividing the area affected by element XXX (aXXX) by the area of the regulatory floodplain (aRF).

1. $rFRB = \frac{aFRB}{aRF}$ 2. $rFDN = \frac{aFDN}{aRF}$ 3. $rCSI = \frac{aCSI}{aRF}$

4. $rLSI = \frac{aLSI}{aRF}$ 5. $rPCF = \frac{aPCF}{aRF}$ 6. $rPSC = \frac{aPSC}{aRF}$

7. $rNBR = \frac{aNBR}{aRF}$ 8. $rENL = \frac{aENL}{aRF}$ 9. $rOHS = \frac{aOHS}{aRF}$

Where an element applies differently to different areas, the impact adjustment ratios for each area must be computed separately. As with Option 1, the area affected by a regulatory standard must exclude areas designated as open space that are receiving OS credit under Activity 420 (Open Space Preservation).

If Option 3 is used, each variable for which credit is requested must be designated on the Impact Adjustment Map described in Section 403 of the *Coordinator's Manual*. More information on the Impact Adjustment Map and calculating areas affected by an element is provided in Sections 402–404 and 432.c and in Figures 430-2 and 430-3 of the *Coordinator's Manual*.

d. Low Density Zoning Impact Adjustment

The impact adjustment for low density zoning (LZ) credits is slightly different from that explained above. With one exception, Option 1 for low density zoning can only be used if the entire regulatory floodplain is zoned to the same density.

a. Option 1

If the entire area of the regulated floodplain (aRF) is zoned for a single low density (s), and is either developed to that density or vacant at the time of application for CRS credit, the impact adjustment ratio rLZs = 1.0 - rOS.

The exception to this rule is that Option 1 can be used if the entire regulatory floodplain is zoned for more than one zone, provided it is based on the highest density allowed. For example, if a community's entire floodplain is zoned for 1-acre lots, 5-acre lots, and 10-acre lots, then Option 1 can be used provided s = 1.

Option 2 can be used for two zones, preferably those that provide the most points (i.e., the two zones with the lowest density). The default value for Option 2 is 0.05, not 0.25 as with the other elements in Activity 430. It is the same as its counterpart element, open space preservation (OS).

b. Option 2

The community may use the default value rLZ = 0.05 for up to two of its low density zones, provided each zone covers at least 5 acres of the regulatory floodplain.

Under Option 3, up to three zones are designated on the Impact Adjustment Map (see Section 403) and the areas affected must be determined in order to calculate the impact adjustments.

c. Option 3

The impact adjustment ratio for each low density zoning district is computed by dividing the area affected by the area of the regulatory floodplain (aRF). Any area of low density zoning for which OS credit is requested must be excluded from the appropriate aLZs.

$$rLZs = \frac{aLZs}{aRF}$$

Example. If all of Gulf Beach County's floodplains were zoned for 2-acre lots or larger AND all of the floodplain was either vacant or developed at the 2-acre density, then the County could use Option 1. rLZ2 = 1.0 - rOS.

Having all of the floodplain vacant or developed to a low density is uncommon. Gulf Beach County has 30% of the floodplain in 2-acre zoning districts, 15% in 5-acre zones and 5% in 10-acre zones. It must use either Option 2 or Option 3 for the impact adjustment.

Under Option 2, the impact adjustment for any two zones is the same, 0.05. The county will receive more credit points by using the two zoning districts with the lowest density, the 5- and 10-acre zones. The credit calculations would produce the following scores:

cLZ5 = LZ5 x rLZ5 = (60 x 5) x 0.05 = 300 x 0.05 = 15

cLZ10 = LZ10 x rLZ10 = (60 x 10) x 0.05 = 600 x 0.05 = 30

cLZ = cLZ5 + cLZ10 = 15 + 30 = 45

Under Option 3, the community must calculate the areas affected by each zoning district. For example, the 2-acre district covers 30% of the floodplain, so rLZ2 = 0.3; the 5-acre district covers 15% of the floodplain, so rLZ5 = 0.15; and the 10-acre area covers 5% of the floodplain, so rLZ10 = 0.05.

cLZ2 = LZ2 x rLZ2 = (60 x 2) x 0.3 = 120 x 0.3 = 36.0

cLZ5 = LZ5 x rLZ5 = (60 x 5) x 0.15 = 300 x 0.15 = 45.0

cLZ10 = LZ10 x rLZ10 = (60 x 10) x 0.05 = 600 x 0.05 = 30

cLZ = cLZ2 + cLZ5 + cLZ10 = 36 + 45 + 30 = 111.0

In this example, Gulf Beach County receives more points under Option 3. This example is used in the completed activity worksheet on page 55.

433 Credit Calculation

In this section of the *Coordinator's Manual* the credit points for each element are multiplied by the impact adjustment. The resulting "c" variables are then added with the special hazards credit (cSH) to produce the total score for Activity 430.

a. cFRB = FRB x rFRB

b. cFDN = FDN x rFDN

c. cCSI = CSI x rCSI

d. cLSI = LSI x rLSI

e. cPCF = PCF x rPCF

f. cPSC = PSC x rPSC

g. cNBR = NBR x rNBR

h. cENL = ENL x rENL

i. cOHS = OHS x rOHS

j. cLZ = cLZ from Section 433LZ (see Section 433LZ in the *Coordinator's Manual*)

k. cSH = cSH from Section 433SH (see the *Special Hazards Supplement*)

l. cSMS = SMS

m. cBCS = BCS

n. c430 = cFRB + cFDN + cCSI + cLSI + cPCF + cPSC
+ cNBR + cENL + cOHS + cLZ + cSH + cSMS + cBCS

Example. Gulf Beach County's ordinance requires two feet of freeboard in the V Zone, FRB = 200. As noted in the example on page 43, this requirement is only in effect in a very small part of the County's regulatory floodplain, so it uses Option 2. Because the County applied for open space preservation credit in Activity 420, it must exclude the area of open space.

rFRB = 0.25

cFRB = FRB x rFRB = 200 x 0.25 = 50.0

Cumulative substantial improvement and substantial damage requirements are tracked for at least 10 years, CSI = 90. This requirement is enforced throughout the floodplain, so Option 1 is used for the impact adjustment. Because the County applied

for open space preservation credit in Activity 420, it must exclude the area of open space. rOS = 0.05.

rCSI = 1.0 - rOS = 1.0 - 0.05 = 0.95

cCSI = CSI x rCSI = 90 x 0.95 = 85.5

New critical facilities must be elevated on fill at least one foot above the 500-year flood level and have dry ground access to high ground outside of the floodplain (see ordinance language on page 25). PCF = 50. This higher regulatory standard is in effect throughout the base floodplain. Because the County applied for open space preservation credit in Activity 420, it must exclude the area of open space. rOS = 0.05.

rPCF = 1.0 - rOS = 1.0 - 0.05 = 0.95

cPCF = PCF x rPCF = 50 x 0.95 = 47.5

The County's low density zoning credits are described in the example on page 45 and illustrated on activity worksheet AW-430LZ on page 55, cLZ = 111.0.

The County's V-Zone freeboard is mandated by a state regulation. It receives 200 points under FRB. There is no impact adjustment for SMS.

SMS = 0.1 x the verified credit (before the impact adjustment)
= 0.1 x FRB = 0.1 x 200 = 20

The County's building official graduated from the EMI course, "Managing Floodplain Development through the National Flood Insurance Program." BCS = 5. There is no impact adjustment for BCS.

There is no credit for FDN, LSI, PSC, NBR, ENL, OHS, cSH, .

c430 = cFRB + cFDN + cCSI + cLSI + cPCF + cPSC
+ cNBR + cENL + cOHS + cLZ + cSH + cSMS + cBCS

c430 = 50.0 + 0 + 85.5 + 0 + 47.5 + 0
+ 0 + 0 + 0 + 111.0 + 0 + 20 + 5 = 319.0 rounded = 319

These figures are used in the example activity worksheets on pages 53–55.

434 Credit Documentation

For a community's first application for a CRS classification, worksheet page 28 of the *CRS Application* is submitted along with the documentation described below. Pages 25 and 29 are submitted if the community wants credit for special hazards regulations and low density zoning. Blank copies of these pages are found at the end of the *CRS Application*.

Subsequent requests for credit are called modifications. Modifications include the activity worksheets AW-430 and AW-431 along with the documentation described below. These worksheets are also used by the ISO/CRS Specialist to calculate the community's verified credit. A completed example is provided on pages 53–54 of this document.

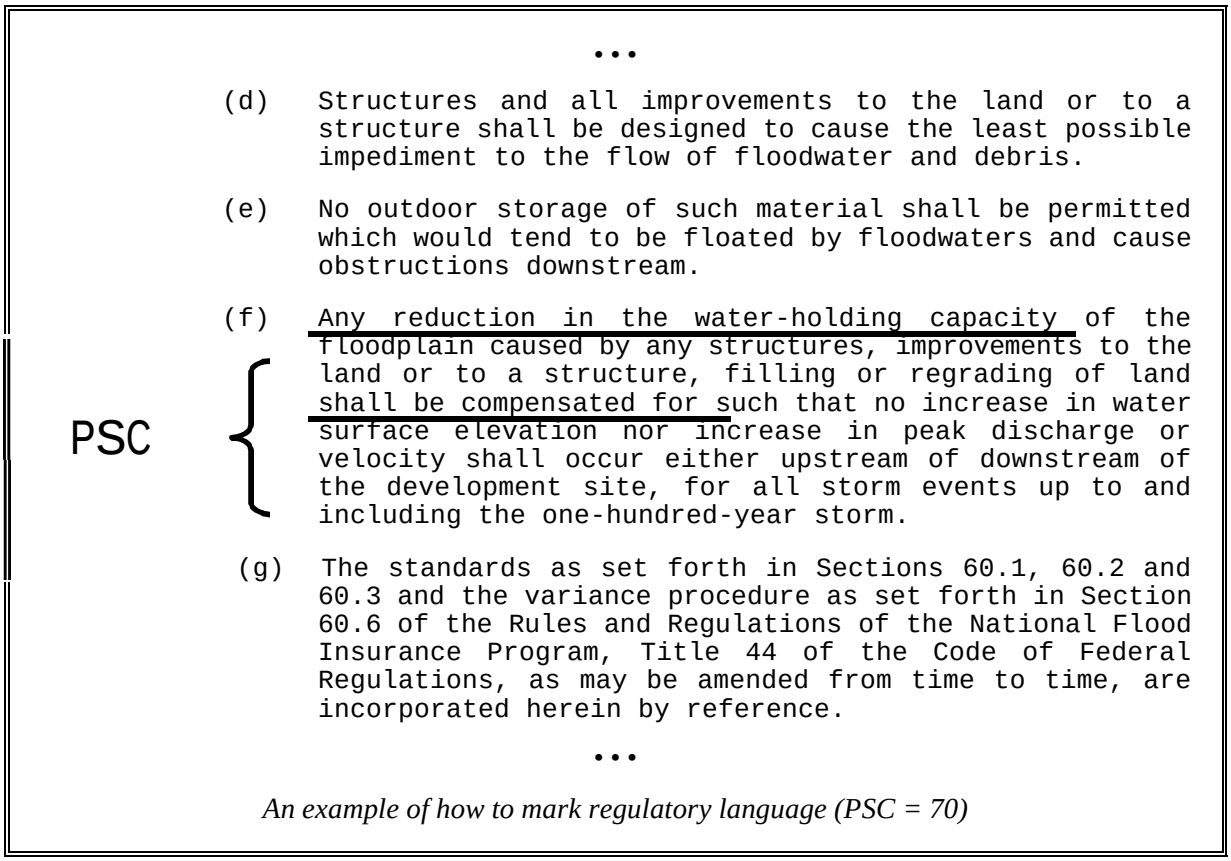
A community may also opt to use the *CRS Calculation Software,* which calculates the points and prints the worksheets. The *CRS Application,* the software and the paper activity worksheets can be ordered using the form in Appendix E of the *Coordinator's Manual* (or by contacting the office listed on the inside of the front cover of this publication).

Section 434 on the *CRS Application* worksheet page 28 and on AW-431 is a checklist for the documentation needed in addition to the worksheet. Up to four items must be included with the community's submittal depending on the credit applied for. These are explained in Sections 434.a through d, below. Records showing that the regulations are enforced are needed during the verification visit. These items are needed to confirm that the community's program meets the CRS credit criteria.

If a modification includes a request for low density zoning (LZ) or regulation of one or more of the special hazards, then AW-430LZ and AW-431LZ and/or AW-430SH through AW-433SH are used. The special hazards worksheets are in the publication *CRS Commentary Supplement for Special Hazards Credit.*

a. Copy of Regulatory Language

In order to verify the community's activity, the community must submit a copy of the state or local law or ordinance language that adopts the regulatory standard. A photocopy of the appropriate page(s) of the ordinance is sufficient and should be attached to the activity worksheet. The appropriate acronym(s) (FRB, FDN, etc.) must be marked in the margins of the sections of the ordinance that apply to this activity.



...

(d) Structures and all improvements to the land or to a structure shall be designed to cause the least possible impediment to the flow of floodwater and debris.

(e) No outdoor storage of such material shall be permitted which would tend to be floated by floodwaters and cause obstructions downstream.

(f) Any reduction in the water-holding capacity of the floodplain caused by any structures, improvements to the land or to a structure, filling or regrading of land shall be compensated for such that no increase in water surface elevation nor increase in peak discharge or velocity shall occur either upstream of downstream of the development site, for all storm events up to and including the one-hundred-year storm.

PSC

(g) The standards as set forth in Sections 60.1, 60.2 and 60.3 and the variance procedure as set forth in Section 60.6 of the Rules and Regulations of the National Flood Insurance Program, Title 44 of the Code of Federal Regulations, as may be amended from time to time, are incorporated herein by reference.

...

An example of how to mark regulatory language (PSC = 70)

For CRS credit, the regulatory language must be adopted and in full force at the time of CRS application. The Chief Executive Officer's application certification is considered to include a certification that the ordinance or statute has been enacted and is being enforced (see Section 212.a in the *CRS Coordinator's Manual*).

b. Impact Adjustment Map

The other items of documentation that are needed are not sent in with the application. Instead, they are made available for the ISO/CRS Specialist during the verification visit. If the community wants to use Option 3, it must have an Impact Adjustment Map. Each area for which an impact adjustment ratio is calculated must be designated on the Impact Adjustment Map and in the map's key. Preparing an Impact Adjustment Map is explained in Section 403 of the *CRS Coordinator's Manual*.

If the community wants help on the Impact Adjustment Map and it does not need a lot of points from this activity for a modification to produce a class change, then it may want to use Option 2 for its submittal. During the verification visit, the ISO/CRS Specialist can help prepare the map and calculate the verified credit points under Option 3.

c. Enforcement Procedures

During the verification visit, the community will need to explain the procedures followed for enforcement of each regulatory standard and will need to produce permit records. This can be done by denying a certificate of occupancy when the final inspection finds noncompliance. However, this approach is often not as effective in correcting a problem because the building is already built. Periodic inspections during construction and correcting violations before the building is completed is a more effective approach.

> **Example.** Gulf Beach County's permit office enforces freeboard (FRB) by recording the required elevation on the permit. When the floor is built or the slab is poured, the builder calls the permit office for an inspection. A surveyor checks the lowest floor elevation to confirm it is high enough. If it is found that the elevation is too low, the permit official places a stop work order on the project until the problem is corrected. When the building has been completed correctly, the surveyor checks the elevation again and completes a FEMA elevation certificate.
>
> During the verification visit, the ISO/CRS Specialist asks for a sample of elevation certificates. He reviews these to verify that new buildings and substantial improvements are built to the freeboard standard. If some of the sample selected do not have the freeboard (even if they have legal variances), the credit points will be adjusted down.

Each element is reviewed differently. For example, low density zoning is verified with a field trip to a sample of the low density districts.

Common Problems. The most common problem found during verification visits is a lack of permit records. Local permit officials are sometimes not aware of all the regulatory requirements

in their ordinances, do not enforce them all, or do not keep appropriate records. Here are examples of the types of records that are needed:

a. Freeboard (FRB): Elevation and floodproofing certificates.

b. Foundation protection (FDN): Engineered foundation certificates, fill compaction testing records, depending on the regulation.

c. Cumulative substantial improvements (CSI): Records that keep track of permits issued over time and compare the cost of each project with the value of the building. See example on page 22.

d. Lower substantial improvements (LSI): Comparisons of building value with the cost of the improvement or repairs.

e. Protection of critical facilities (PCF): Permit records for critical facilities.

f. Protection of floodplain storage capacity (PSC): Compensatory storage calculations.

g. Natural and beneficial functions regulations (NBR): Site plans showing setbacks.

h. Enclosure limits (ENL): Permit records on elevated buildings.

i. Other higher standards (OHS): Depends on the regulation.

j. Low density zoning (LZ): Field checks of low density zoning districts.

k. Special hazards regulations (SH): Depends on the regulation.

l. State-mandated regulatory standards (SMS): Not applicable; credit is based on state requirements and the verified score for the other elements.

m. Building code and staffing (BCS): ISO's BCEGS classification documentation, certificates of graduation, or floodplain manager certification.

d. Staff Certification

If the community is applying for credit under building code and staffing (BCS) for having trained or certified staff, it needs to provide documentation. This could include the graduation certificate from the Emergency Management Institute, the home study course, or other FEMA approved equivalent NFIP training. If a staff member qualified as a certified floodplain manager, the documentation would be the certification letter and documentation that the person is maintaining his or her certification by meeting the continuing education requirements.

435 For More Information

Most state NFIP coordinating offices have prepared model ordinances with provisions that exceed the minimum NFIP standards. Additional help on regulatory provisions may be available from state planning or community affairs agencies and regional planning commissions.

Regulations in the areas affected by the special hazards are discussed in more detail in *CRS Commentary Supplement for Special Hazards Credit*. See Appendix E in the *CRS Coordinator's Manual* to order free copies of the following publications.

CRS Commentary Supplement for Special Hazards Credit. This publication is necessary to apply for CRS credit for special hazard areas.

CRS Credit for Management of Uncertain Flow Paths.

CRS Credit for Management of Areas Adjacent to Closed Basin Lakes.

CRS Credit for Management of Ice Jam Hazards.

CRS Credit for Management of Floodprone Areas Subject to Land Subsidence.

CRS Credit for Management of Pacific and Caribbean Tsunami Hazards

The following documents are available from FEMA Publications by calling 1-800-480-2520 or faxing a request to (301) 362-5335.

Answers to Questions About Substantially Damaged Buildings, FEMA-213, May 1991

User's Guide to Technical Bulletins, FIA-TB-0, April 1993. (Also available from FEMA's Website at http://www.fema.gov/mit/techbul.htm).

Openings in Foundation Walls, FIA-TB-1, April 1993. (Also available from FEMA's Website at http://www.fema.gov/mit/techbul.htm).

Flood-Resistant Materials Requirements, FIA-TB-2, April 1993. (Also available from FEMA's Website at http://www.fema.gov/mit/techbul.htm).

Non-Residential Floodproofing—Requirements and Certification, FIA-TB-3, April 1993. (Also available from FEMA's Website at http://www.fema.gov/mit/techbul.htm).

Elevator Installation, FIA-TB-4, April 1993. (Also available from FEMA's Website at http://www.fema.gov/mit/techbul.htm).

Free-of-Obstruction Requirements, FIA-TB-5, April 1993. (Also available from FEMA's Website at http://www.fema.gov/mit/techbul.htm).

Below-Grade Parking Requirements, FIA-TB-6, April 1993. (Also available from FEMA's Website at http://www.fema.gov/mit/techbul.htm).

Wet Floodproofing Requirements, FIA-TB-7, December 1993. (Also available from FEMA's Website at http://www.fema.gov/mit/techbul.htm).

Corrosion Protection for Metal Connections in Coastal Areas, FIA-TB-8, 1996. (Also available from FEMA's Website at http://www.fema.gov/mit/techbul.htm).

Reducing Losses in High Risk Flood Hazard Areas—A Guidebook for Local Officials, FEMA-116, Federal Emergency Management Agency, 1987.

Interim Guidance for State and Local Officials—Increased Cost of Compliance Coverage, FEMA, 1997. (Also available from FEMA's Website at http://www.fema.gov/library/lib06.htm).

The Emergency Management Institute (EMI) is a FEMA training center located in Emmitsburg, Maryland. Stipends to cover travel, registration, and rooms are usually available from FEMA. Starting in 1999, EMI will conduct a home study version of "Managing Floodplain Development through the National Flood Insurance Program." For more information, call EMI at 1-800-238-3358 or your state emergency management agency's training office.

More information on habitat conservation plans can be found in *Habitat Conservation Planning Handbook*, U.S. Fish and Wildlife Service and National Marine Fisheries Service, November 1996. See Appendix F for the appropriate office of the Fish and Wildlife Service.

Gulf Beach County's Activity Worksheet, AW-430

430 HIGHER REGULATORY STANDARDS Community: Gulf Beach County

432 Impact Adjustment:

a. Option 1: Enter rOS from AW-420.

If you did not apply for Activity 420, then rOS = 0

1. rFRB = 1.0 - rOS _____ = _____
2. rFDN = 1.0 - rOS _____ = _____
3. rCSI = 1.0 – rOS 0.05 = 0.95
4. rLSI = 1.0 - rOS _____ = _____
5. rPCF = 1.0 – rOS 0.05 = 0.95
6. rPSC = 1.0 – rOS _____ = _____
7. rNBR = 1.0 – rOS _____ = _____
8. rENL = 1.0 – rOS _____ = _____
9. rOHS = 1.0 – rOS _____ = _____

1. rFRB = 0.25

1. rFRB = 0.25
2. rFDN = 0.25
3. rCSI = 0.25
4. rLSI = 0.25
5. rPCF = 0.25
6. rPSC = 0.25
7. rNBR = 0.25
8. rENL = 0.25
9. rOHS = 0.25

c. Option 3:

1. rFRB = aFRB _____ = ____ / aRF ____
2. rFDN = aFDN _____ = _____ / aRF _____
3. rCSI = aCSI _____ = _____ / aRF _____
4. rLSI = aLSI _____ = _____ / aRF _____
5. rPCF = aPCF _____ = _____ / aRF
6. rPSC = aPSC _____ = _____ / aRF _____
7. rNBR = aNBR _____ = _____ / aRF _____
8. rENL = aENL _____ = _____ / aRF _____
9. rOHS = aOHS _____ = _____ / aRF _____

Activity Worksheet AW-430 Edition: January 1999

Gulf Beach County's Activity Worksheet, AW-431

433 Credit Calculation:

a. cFRB + FRB 200 x rFRB 0.25 — cFRB = 50.0

b. cFDN = FDN _____ x rFDN _____ — cFDN = _____

c. cCSI = CSI 90 x rCSI 0.95 — cCSI = 85.5

d. cLSI = LSI _____ x rLSI _____ — cLSI = _____

e. cPCF = PCF 50 x rPCF 0.95 — PCF = 47.5

f. cPSC = PSC _____ x rPSC _____ — cPSC = _____

g. cNBR = NBR _____ x rNBR _____ — cNBR = _____

h. cENL = ENL _____ x rENL _____ — cENL = _____

i. cOHS = OHS _____ x rOHS _____ — cOHS = _____

j. cLZ (from AW-430LZ) — cLZ = 111.0

k. cSH (from AW-430SH) — cSH = _____

l. cSMS — cSMS = 20

m. cBCS — cBCS = 5

Add lines a through m above: 319.0

c430 = value above rounded to the nearest whole number: c430 = 319

Enter this value on AW-720.

434 Credit Documentation: The following documentation is attached to this worksheet:

✓ a. The state or local law or ordinance language that adopts the regulatory standard with the appropriate acronyms noted in the margin.

We will have the following documentation available to verify implementation of this activity:

N/A b. [If an impact adjustment uses Option 3] The Impact Adjustment Map.

✓ c. An explanation of our enforcement procedure

✓ d. [If applying for credit for building code and staffing under Section 431.m] A copy of the certificate of graduation or floodplain manager certification.

Activity Worksheet AW-431 Edition: January 1999

Gulf Beach County's Activity Worksheet, AW-430LZ

430LZ LOW DENSITY ZONING **Community:** Gulf Beach County

431LZ Credit Points:

LZs = 60 x s, where s is the minimum lot size in acres.

a. LZ 2 = 60 x 2 LZ 2 = 120.0

b. LZ 5 = 60 x 5 LZ 5 = 300.0

c. LZ 10 = 60 x 10 LZ 10 = 600.0

432LZ Impact Adjustment:

a. Option 1: rLZ____ = 1.0 - rOS _____ = _____

b. Option 2: rLZ____ = 0.05
rLZ____ = 0.05

c. Option 3: rLZ 2 = aLZ 18,000 / aRF 60,000 = 0.3

rLZ 5 = aLZ 9,000 / aRF 60,000 = 0.15

rLZ 10 = aLZ 3,000 / aRF 60,000 = 0.05

433LZ Credit Points:

cLZ 2 = LZ 2 120 x rLZ 2 0.3 cLZ 2 = 36.0

cLZ 5 = LZ 5 300 x rLZ 5 0.15 cLZ 5 = 45.0

cLZ 10 = LZ 10 600 x rLZ 10 0.05 cLZ 10 = 30.0

Add the lines above: 111.0

Enter this value on AW-430.

434LZ Credit Documentation: The following documentation is attached to this worksheet:

✓ a. A copy of our zoning ordinance language that includes the definitions and restrictions for each LZ with the acronyms marked in the margin.

We will have the following documentation available to verify implementation of this activity:

✓ b. [If the impact adjustment uses Option 3] The Impact Adjustment Map. Each zoning district will be designated on the map.

✓ c. An explanation of the procedures followed for enforcement of the regulatory standard.

Activity Worksheet AW-430LZ Edition: January 1999

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